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Chemical Week

APRIL 23, 1960 Price 50 cents

Chemicals vs. cancer—serum and cigarettes spark new gains . p. 35

Trade with east Europe? Industry men weigh profits, pitfalls . . p. 45

Trim casualty costs. Expert tips for plant management . . . p. 63

Nease's success ladder. In seven years, 90-fold appreciation . . . p. 82

CW Report: Boron's br ***)5***

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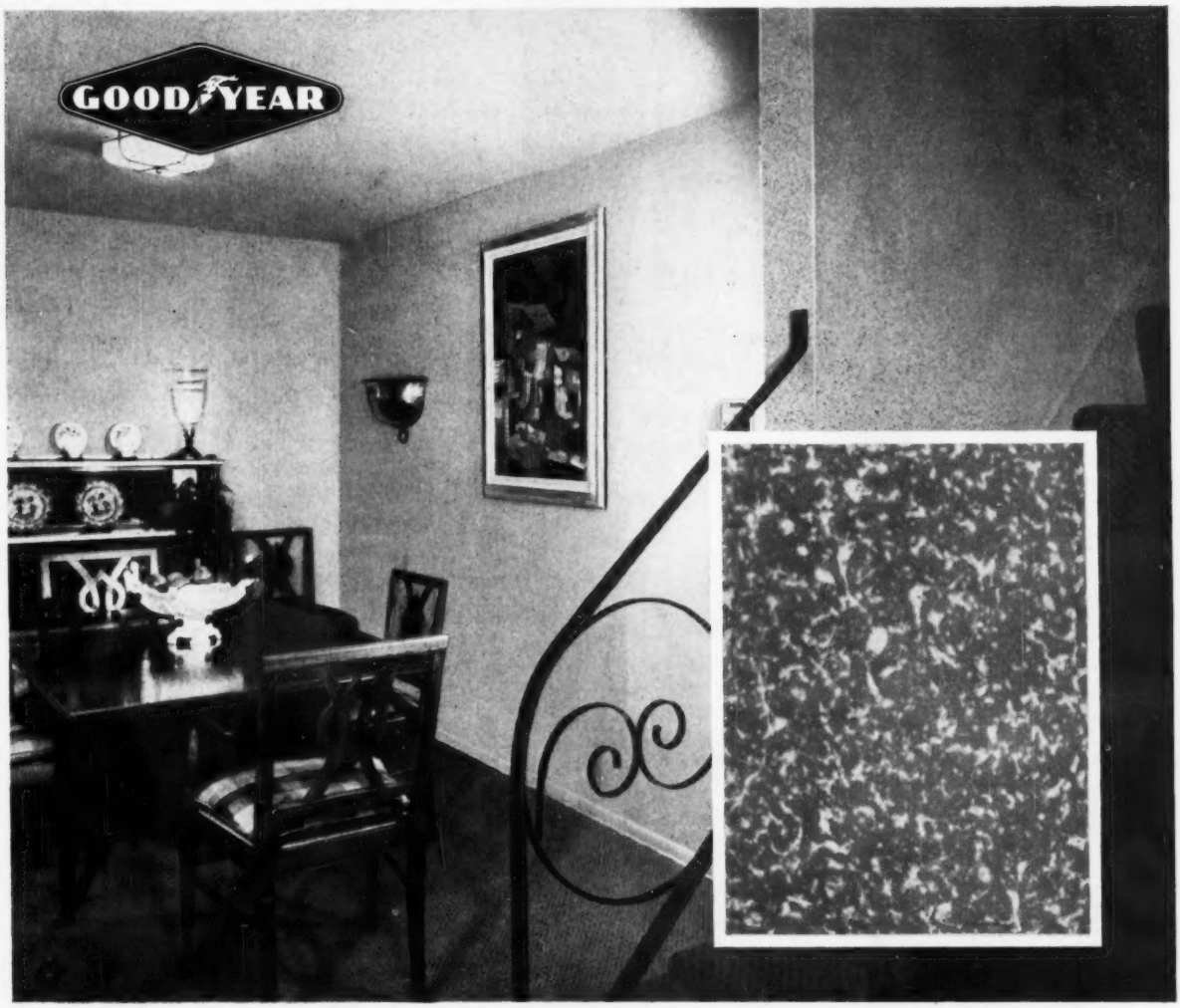

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TOP OF THE WEEK **APRIL 23, 1960**

- **First look at second-quarter sales** shows widespread increases; earnings pattern not so favorable .....**p. 37**
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- **Four new fibers—vanguard of whole new series of synthetics?** Here's where fiber research is heading .....**p. 71**
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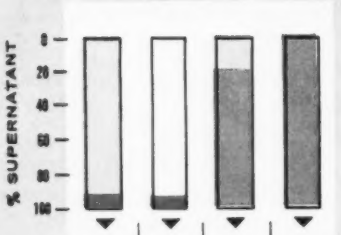
news briefs...

ON THE CREATIVE USE OF M&C PROCESS MATERIALS

*Better, Low-Cost Suspending Agent— new Improved Attagel® 20

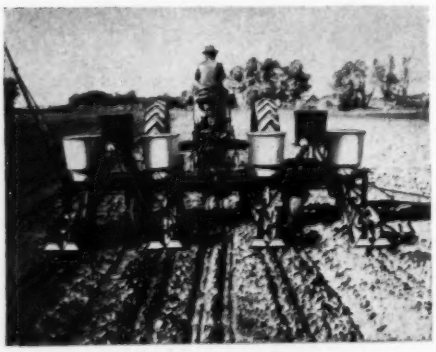
Serving equally well in both organic and aqueous systems as suspending, emulsifying or thickening agents, new Attagel 20 is a colloidal grade of attapulgite. Attagel 20 disperses to an average particle size of less than 0.1 micron—in organic systems directly with use of a surfactant, in aqueous systems by application of high shear. The illustration shows the suspending characteristics and low material costs for new Attagel 20. In this evaluation the system was a red oxide-titanium dioxide pigment ground in a medium oil alkyd and reduced with mineral spirits. Pigment and oil percentages were kept constant: 13.50 red oxide, 1.50 TiO_2, and 10.00 alkyd (50% NVM). 100 ml of each sample was allowed to settle for 96 hours. The gradations in the graph denote appearance at end of the settling period (white is clear liquid). Ratio of Attagel 20 to surfactant was 3:1—however, the optimum ratios for other pigment combinations can vary and should be determined for each formulation. If you use emulsifying, thickening, or suspending agents—for organic or aqueous systems—you too can benefit from *new* Attagel 20. *Starred item* . . . check and mail the coupon.

Settling Time . . . Material Costs of Attagel 20 Formulations



Attagel 20, %	0.00	1.00	2.50	5.00
Surfactant, %	0.00	0.33	0.83	1.70
Mineral Spirits, %	75.00	73.67	71.56	68.30
Pigment-Oil, %	25.00	25.00	25.00	25.00
Raw Materials, approx. cents/lb.	7.0	7.2	7.6	7.9

Granular Herbicides do lasting weed-killing jobs...replace mowing and cultivation



Granular pre-emergence herbicides are another example of *chemicalization* to perform laborious, tedious jobs better. Corn and other row crops, rights of way for utilities and railroads, highway and turnpike roadsides, refinery and chemical plant tank farm and plant areas—all can be maintained with chemical weed killers in the manner developed for farm and orchard application.

What makes granular herbicides so much better than other methods and formulations?

results obtained at *lower cost*

ease to produce, package, store, handle

less drift in application

fall-through to soil surface instead of adhering to leaves and other surfaces

flexibility in application methods

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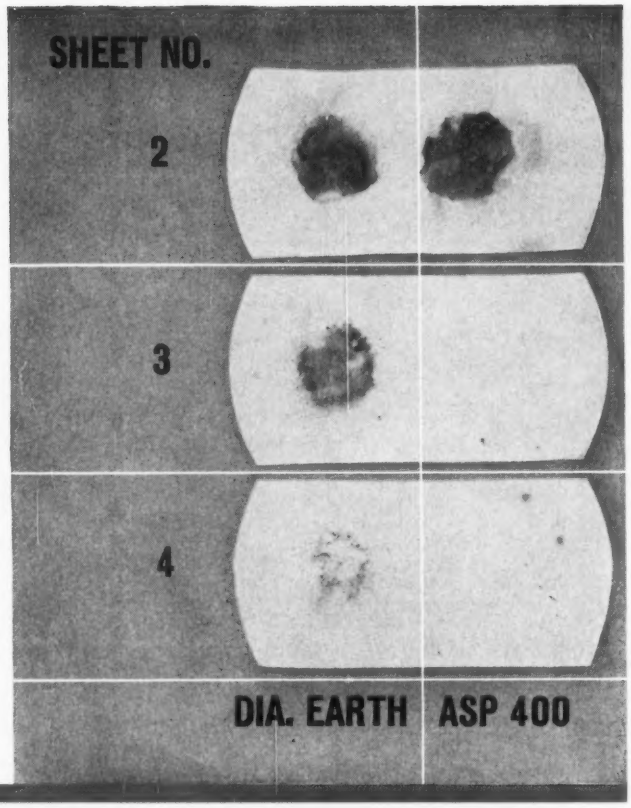
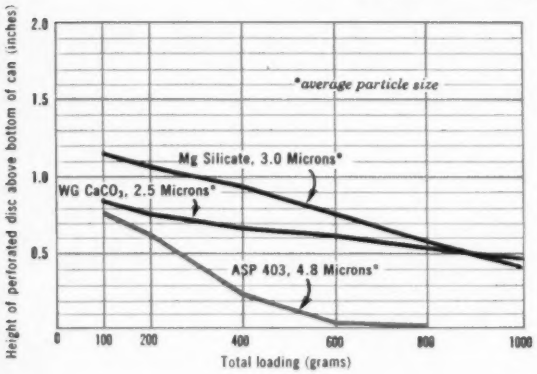
*Adhesive Users: here's superior penetration control to improve products and lower costs (test details on request)

Photo shows superiority of M & C's ASP 400 additive in keeping glue at the glue line (it hardly went beyond Sheet 2 of the stacked papers). Ability of the ASP's to prevent adhesive migration gives adhesive users such positive advantages as: increased mileage; great bond strength; dry, hard products; low costs. Would you like to extend these good points to your glue operations? If one, or both, of the faces you are gluing is porous, it can be done. This is a *starred item*. Use the coupon.



Paint Chemists: new Surface Modified ASP extender pigments add superior suspension properties to paints



Here, in graph form, is proof of the superior non-settling characteristics imparted to organic protective coatings by M & C's new Surface Modified ASP 403. Each formulation was ground 5 hours and allowed to sit on the shelf for 15 months. Then the settling characteristics of the paint were measured with the Patton Pigment Settling Gauge (test details on request). Interpretation of the results: the higher the reading, the more settling and the harder the body of settled pigment. In the formulation with ASP 403, the weighted probe went completely through the paint to the bottom of the can with minimum weight and in minimum time.

Because they're water-washed, the ASP's are virtually chemically inert materials. This explains the stability, weatherability, and color integrity which they bring to protective coatings. The water washing also assures uniformity of particle size and shape . . . makes easy dispersibility and shorter grinding time. Get the story on M & C's Aluminum Silicate Pigments . . . use the coupon.

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For more data, see your 1960 Chemical Materials Catalog, pages 451-458

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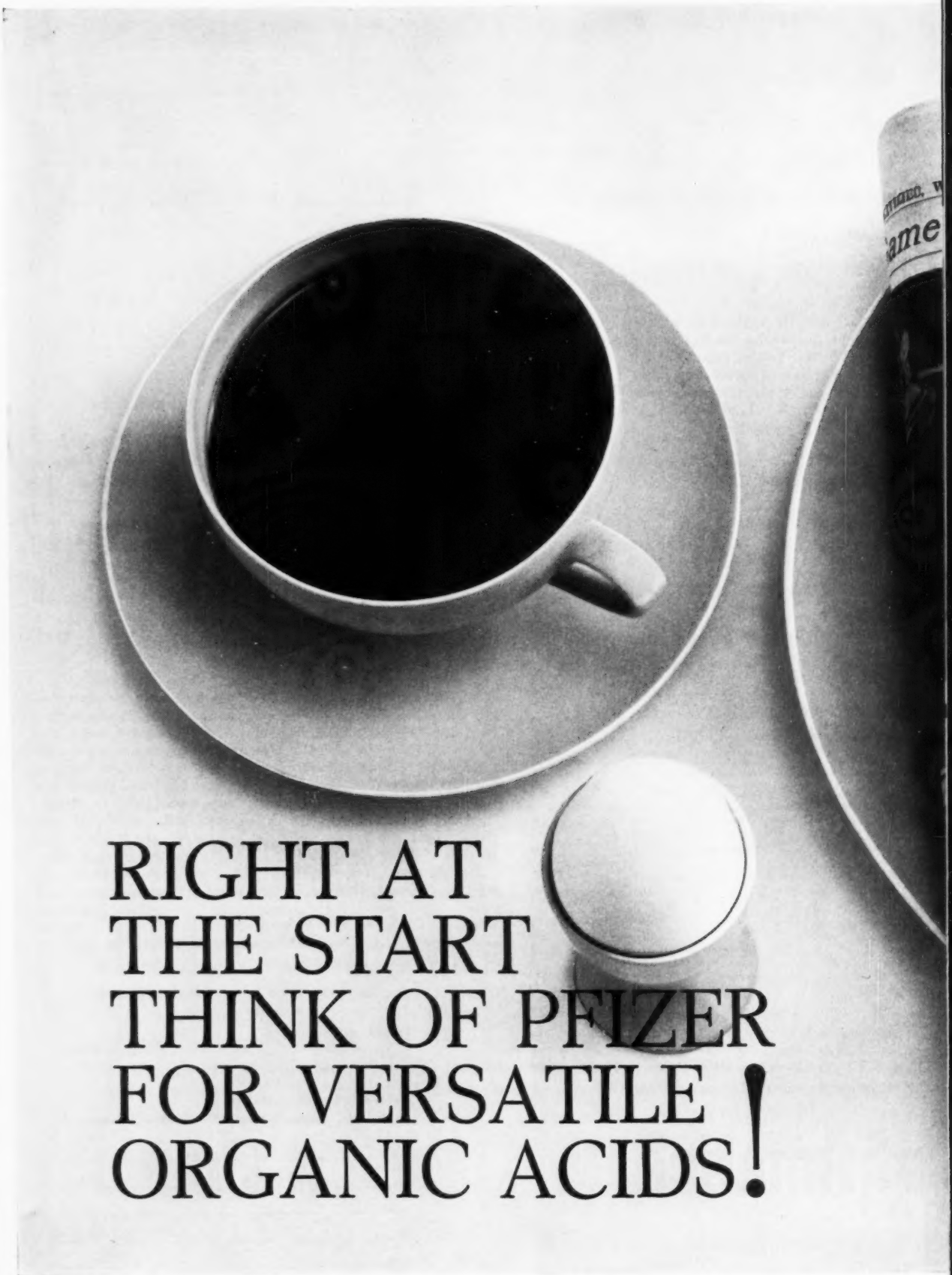
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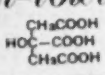

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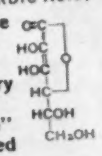

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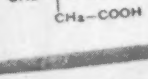
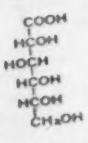


GLUCONIC ACID—Non-toxic—outstanding sequesterant in caustic solutions—low corrosion rate—extremely useful in the formulation of metal and glass cleaning compounds for aluminum etching, rust removal, paint stripping, glass mold cleaning and bottle washing. Also used in electroplating and other industrial sequesterant applications.



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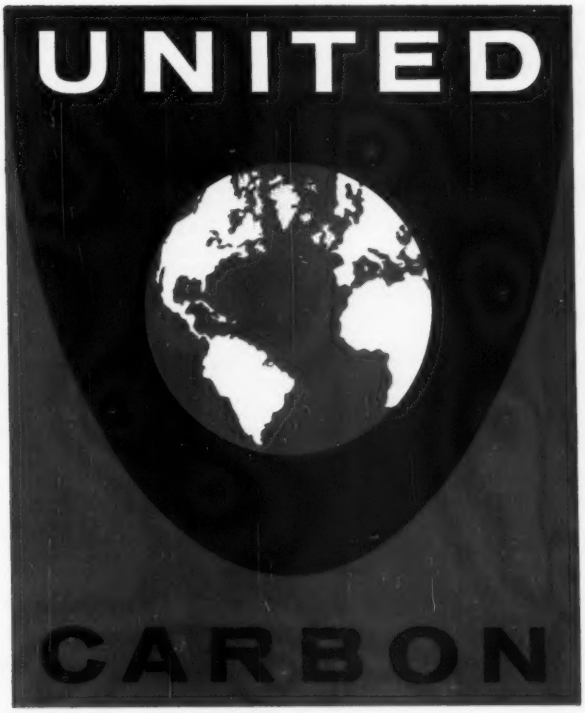

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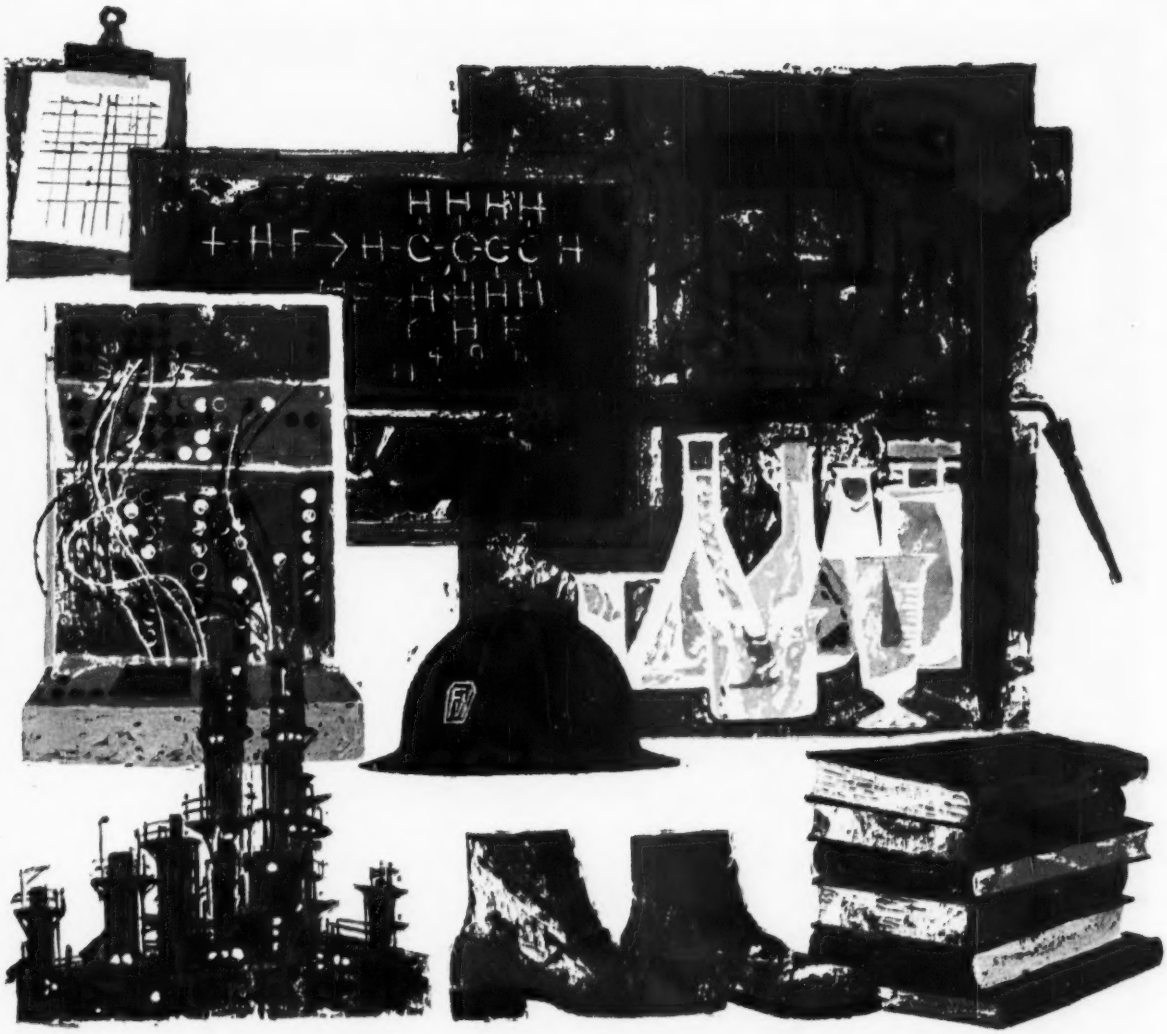

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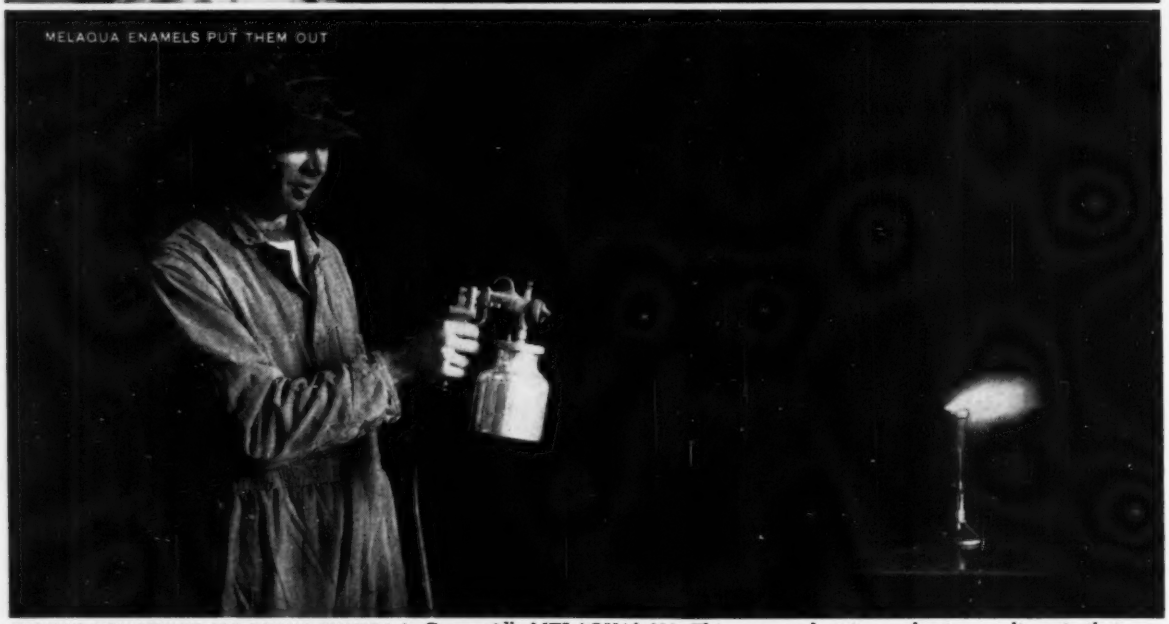
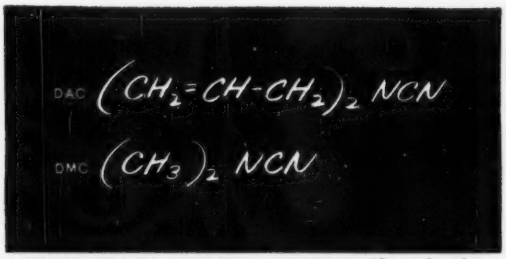


EXCITING NEW VEHICLE FOR BAKING ENAMELS is Cyanamid's MELAQUA* 600. This new product is a melamine-acrylic resin that produces a ready-to-spray enamel with only the addition of pigment and water. By excluding the use of solvents, Melaqua 600 completely eliminates fire hazards (see photos above). In addition to its safety factor, it gives the enamel such desirable qualities as exceptionally good flow and levelling, high gloss, and clearer, brighter colors than solvent enamels of the same pigmentation. Melaqua 600 enamels retain colors well under heat and light, have outstanding outdoor durability. Suggested uses for this new resin are full color, pastel metallescent industrial and automotive finishes.

*Trademark (Plastics and Resins Division)



DOOR-OPENERS TO NITROGEN CHEMISTRY. If you've been looking for a way to participate in the promising field of nitrogen chemistry, DIALKYL CYANAMIDES will prove helpful. Drum quantities of these compounds are available for the synthesis of substituted guanidines, biguanides, normal and isoureas, thioureas and secondary amines. Copolymers of *diallyl cyanamide* can be used as plasticizers, adhesives, molding, casting, and laminating resins, and for electrical insulation. *Dimethyl cyanamide* has unusual solvent properties – may also be used for hydraulic fluids and as a corrosion inhibitor.

(Market Development Department)

GOOD NEWS FOR RUBBER PROCESSORS. Natural, SBR and nitrile rubber products can now be manufactured more efficiently and economically – thanks to the excellent dispersibility of Cyanamid's new MBTS ACCELERATOR. The new MBTS makes possible such process savings as: shorter mixing cycles, lower reject rates, better dispersion, elimination of refining and master-batching. Its vulcanization and accelerating characteristics remain unchanged. Factory trials indicate that rubber processors get better and more uniform dispersion within the time cycle currently used for mixing. New MBTS is a high purity, light color product. (Rubber Chemicals Department)

NEW CATALYST TAKES THE FIELD. Cyanamid's new fluid cracking catalyst, AEROCAT® 3C*, is now undergoing extensive testing in the field. Composed of silica, alumina and magnesia, the new catalyst is designed for more flexible and profitable refinery operation. Its advantages over current silica-alumina compositions: yields more gasoline, more propylene and more butylene – produces less coke and dry gas. Aerocat 3C is available in two forms: Aerocat 3C-12 for high gasoline yield; Aerocat 3C-20 for high propylene and butylene yields.

**Patent applied for.* (Industrial Chemical Division)

CYANAMID

AMERICAN CYANAMID COMPANY
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

All wool "Enchantress"—one of those heavenly carpets by Lees.

MORE AND LOVELIER CARPET COLORS. Here's good news for the carpet industry and its consumers: Cyanamid's new CALCO® LEVELING SALT LV eliminates objectionable striped or Barré effects encountered in dyeing wool carpeting – permits carpets to be dyed effectively in the widest range of colors ever! The agent also is expected to prove equally advantageous in dyeing nylon carpeting, hosiery and sweaters. When used with neutral dyes, Calco Leveling Salt produces deeper, level, solidly dyed shades on wool and/or nylon stocks, yarns and fabrics. Cyanamid's new agent allows the colorant to dye rather than stain the fiber. As a result, shades may be matched by adding color in process – not possible with other agents of this type. Calco Leveling Salt has no adverse effect on the fastness of the dyes used. (Dyes Department)

For further information on products in this advertisement wire, phone – or mail this coupon to:

AMERICAN CYANAMID COMPANY
30 Rockefeller Plaza, New York 20, N. Y.

Please send me additional information on

- ☐ MELAQUA 600
- ☐ MBTS ACCELERATOR
- ☐ CALCO® LEVELING SALT LV
- ☐ AEROCAT 3C
- ☐ DIALKYL CYANAMIDES

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LETTERS

Secrets Cause Progress

TO THE EDITOR: Yes, trade secrets are necessary! [Re your question] of the value of trade secrets . . . (*Viewpoint, Feb. 27*) . . .

If we grant that the economic drive inherent in competition is essential to the continuous production of better and more varied industrial products at lower prices, then trade secrets, as you define them, are necessary and desirable. The company that can "steal a march" on its competition either through advanced technical developments or better analysis of the potential market or raw-materials situation has a distinct advantage over his competitors. The urge to obtain such advantage is the chief driving force in process and market development. Without this drive, developments for improving product quality or reducing costs would be far slower.

Granted, many companies overdo the secrecy. A trade secret remains a secret for only a short time, particularly in the case of information connected with marketing. Once a plant is in operation, the disposal of the product cannot be kept very confidential. Technical secrets, on the other hand, may be maintained much longer — particularly those involving the finer points of operating technique, which may often determine the difference between success and failure; but even these can be relatively short-lived and can, in most cases, be worked out by the competition in a reasonable length of time.

The value that industrial concerns put on their trade secrets is evidenced by the court decisions in a number of recent cases where companies have been awarded substantial damages for unauthorized use of their know-how.

You pointed out in your editorial the apparent advantages of a totalitarian state, such as Russia, which can coordinate its over-all industrial production and can prevent duplication of the waste due to duplication of effort. This time-honored argument by national planners is valid only to a very limited extent. Actually, in our capitalistic-democratic economy, duplication and poor business judgment frequently leads to valuable advances. For example, . . . two or more companies' building, without adequate knowledge of what the other is doing to meet a given market, produces an oversupply of the material. This results in very active development, as a matter of self-preservation, by the companies to develop further markets for the material. This becomes a never-ending chain. This is the sort of activity that has produced the rapid industrial development in this country.

It seems to me that the elimination of the competitive drive in order to gain the advantages of over-all planning is a short-sighted type of economic philosophy.

J. A. PATTERSON
President
Chempro, Inc.
Pittsburgh, Pa.

We agree. But if it is assumed that ignorance can sometimes cause wastefulness, it is better for industry to share knowledge than for the government to step in and do our planning for us.—ED.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

50 Million for Cary

TO THE EDITOR: Your report concerning "Acetylene" (*March 26*) is extremely interesting and illuminating. This CHEMICAL WEEK report, coupled with your recent reports on ethylene and propylene, has been most helpful to us as corroborating information for marketing plans.

I should like to take this opportunity, however, to point out a small error in the acetylene report, which listed Cary Chemicals as having a capacity of 35 million lbs. of resin per year. A more accurate measure of Cary's capacity is 50 million lbs., as of the first of March, when our expanded facilities went onstream. As your article accurately pointed out, this figure indicates an order of magnitude depending upon the product mix produced by our reactor units.

ELWOOD W. PHARES
Sales Manager
Cary Chemicals Inc.
New Brunswick, N.J.

FGAN Not Explosive

TO THE EDITOR: Mr. Ferrieri states (*Feb. 13, p. 13*) that "there have been quite a few explosions of ammonium nitrate. In fact, you showed one the week before (*Jan. 16, p. 75*)."

The photograph to which Mr. Ferrieri referred was of the Roseburg, Ore., explosion. The Roseburg disaster was caused by a manufactured blasting agent — not fertilizer-grade ammonium nitrate as produced and sold today.

Mr. Ferrieri might also be interested to learn that the "quite a few explosions" to which he refers have been carefully analyzed by the U.S. Coast Guard and other government agencies interested in the safe handling and shipment of ammonium nitrate. In every case which Mr. Ferrieri erroneously refers to as "ammonium nitrate explosions," the ammonium nitrate involved was mixed with hydrocarbons or high explosives. All cases also involved confinement with resultant high temperatures and pressures.

Mr. Ferrieri further states that the "industry fights shipping regulations that are designed to safeguard the public." This statement is certainly not true.

Chemical firms print and distribute technical bulletins about their products. These bulletins include approved procedures for safe handling, shipping and storing. In addition, the Manufacturing Chemists' Assn. at Washington, D.C., prints and distributes chemical safety data sheets, which cover various chemicals and chemical products, and which contain complete instructions for safe handling and shipping.

CHARLES J. KNAPP
Monsanto Chemical Co.
St. Louis, Mo.

MEETINGS

American Ceramic Society, annual meeting, Bellevue Stratford Hotel, Philadelphia, April 24-28.

Society of Plastics Engineers; conference theme: "Plastics in Petroleum and Petrochemical Industries," Dallas, Tex., April 28.

Second European Symposium on Chemical Reaction Engineering, Amsterdam, Holland, April 28-30.

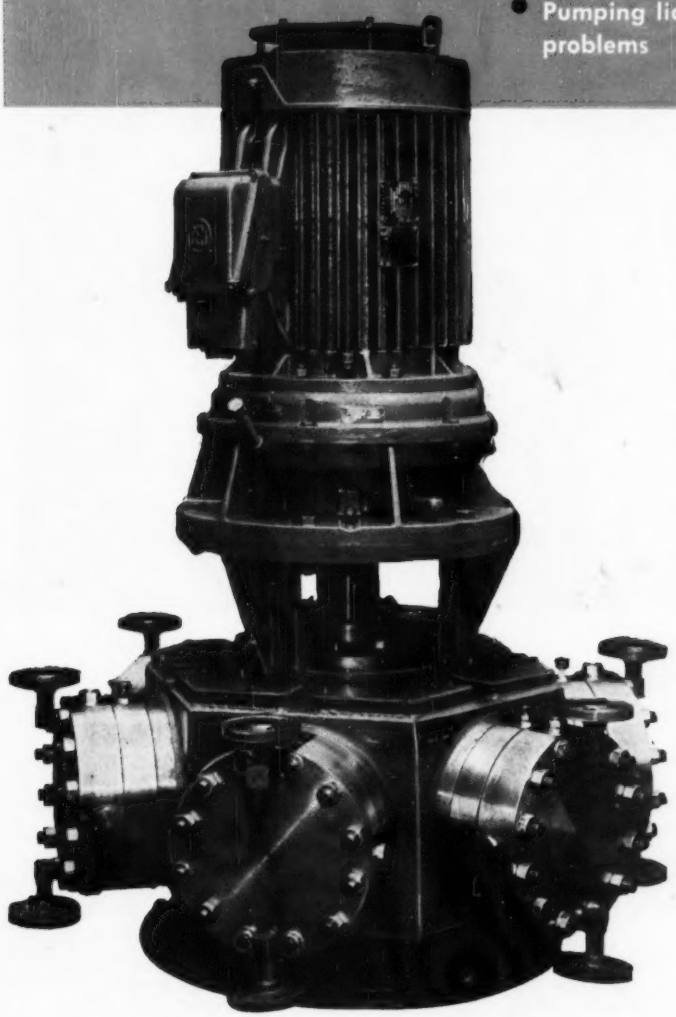
Parenteral Drug Assn., Warwick Hotel, Philadelphia, April 29.

CORBLIN DIAPHRAGM-TYPE PUMPS

handle liquids too difficult for ordinary piston-type pumps!

CORBLIN PUMPS are designed especially for:

- Pumping liquids where NO TRACE of contamination or leakage can be tolerated
- Pumping liquids that present severe corrosion problems



Corblin pumps utilize, as their pumping members, metal diaphragms, hydraulically pulsed to provide suction and discharge action. This makes possible the pumping of hard-to-handle liquids without the slightest trace of contamination or leakage. The pumps will handle corrosive liquids without damage to the pump. This is possible because all parts of the pumps that come into contact with pumped fluids may be made of corrosion-resistant materials. Units are available in all types of stainless steel, Hasteloy alloys, copper alloys, titanium, etc.

Models are available with constant or infinitely variable outputs; capacities to 2,000 gal./hr., and pressures to 15,000 p. s. i. The unit shown at left is a six-stage pump that discharges fluid at a rate of 2,000 gal./hr., at a pressure of 2,000 p. s. i. This particular pump, built to handle radioactive heavy water, uses distilled water to pulse the diaphragms.

COMPRESSORS ALSO AVAILABLE

Operating on the same principle as the diaphragm-type pumps, Corblin compressors offer contamination-free and leak-free compression of all gases including carbon monoxide, carbon dioxide, chlorine, fluorine, ethylene, argon, helium, oxygen, air, etc. Models are available for pressures to 30,000 p. s. i.; and capacities under certain operating conditions, to several hundred s. c. f. m.

FREE BULLETIN

Aminco will forward on request a six-page bulletin that illustrates and describes many types of Corblin pumps and compressors. Send for free Bulletin 4071-Z2

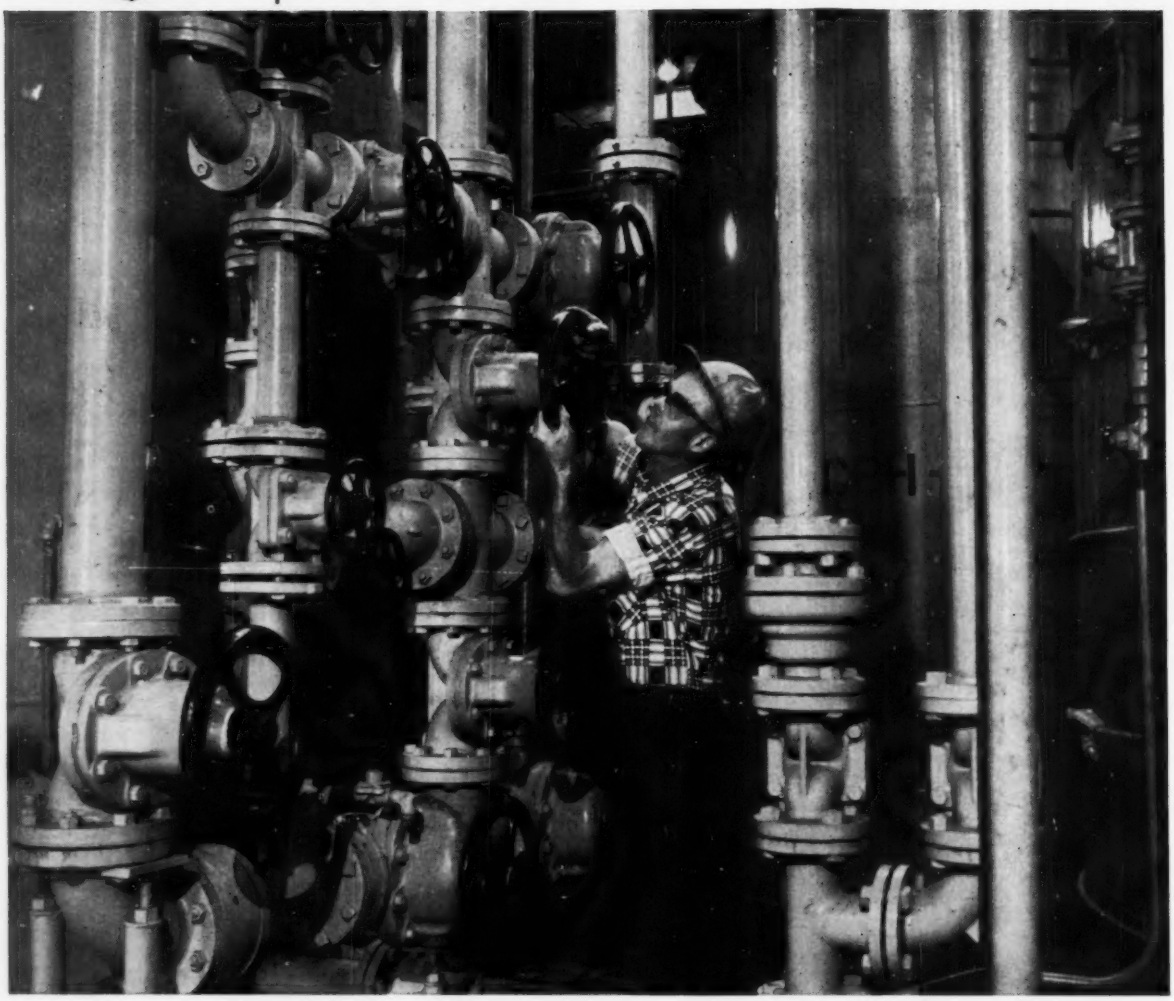
AMINCO

AMERICAN INSTRUMENT CO., INC.

8030 Georgia Ave., Silver Spring, Md.

Exclusive distributors of Corblin pumps & compressors in North America

DOW | **SARAN LINED PIPE**



5 miles of pipe, 12 years of service

Saran Lined Pipe keeps process acids flowing!

When five miles of process piping must carry an unfailing flow of highly corrosive acids, thorium salt solutions and slurries . . . when frequent flow changes require quick, on-the-spot pipeline modifications . . . that's when the extreme corrosion resistance and easy workability of Saran Lined Pipe make this process pipeline a process lifeline.

Above is one section of the approximately five miles of Saran Lined Pipe which carries process chemicals in thorium recovery operations at the American Potash & Chemical Corporation's Lindsay Chemical Division plant, West Chicago, Illinois. In this process, Saran Lined Pipe is required to carry highly corrosive materials: sulphuric acid slurries for ore leaching; reacted thorium sulphate solutions and waste slurries; concentrated hydrochloric acid, hydrofluoric acid slurries. The pipe network has been in constant use since 1947, and *there's never been a major process shutdown because of pipeline failure!*

Equally as important to Lindsay as corrosion resistance are the workability and strength of Saran Lined Pipe. The nature of the process requires frequent flow changes, meaning frequent changes in piping. Necessary pipeline modifications are done quickly and easily by plant personnel, cutting process downtime to a matter of hours. And high physical strength of the pipe minimizes the need for extensive pipe supports!

Saran Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, from below zero to 200°F. They can be cut, fitted and modified easily in the field without special equipment. For more information, write Saran Lined Pipe Company, 2415 Burdette Ave., Ferndale, Michigan, Dept. 2283AM4-23.

See "The Dow Hour of Great Mysteries" on NBC-TV

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

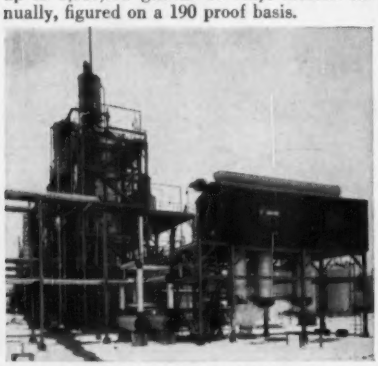
ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U.S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

April 23 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1960

New Ether Hydration Unit Ups U.S.I.'s Potential Ethyl Alcohol Capacity

A new ether hydration unit has just been completed at U.S.I.'s ethyl alcohol plant, Tuscola, Ill. With the new unit it is now possible for the company to take part of its ethyl ether production, formed as a by-product of the ethyl alcohol production process, and convert it to ethyl alcohol. The new unit gives the company an additional potential capacity of up to 6,000,000 gallons of ethyl alcohol annually, figured on a 190 proof basis.



New ether hydration unit at U.S.I.'s ethyl alcohol plant, Tuscola, Illinois.

U.S.I. refines a portion of the by-product ether to U.S.P., A.C.S., Refined and Technical grades for industrial, institutional and laboratory use. Part of the remaining material can now be converted into a low-proof ethyl alcohol through a catalytic process developed by U.S.I. The low-proof alcohol is then introduced into the regular process stream at U.S.I.'s alcohol plant for conversion to 190 proof or anhydrous product.

The new ether hydration unit enables U.S.I. to have a flexible means of keeping alcohol and ether production in balance. The company can serve the needs of these markets without being restricted by facilities.

Sodium Treatment Found to Increase Carbon Activity

A recent study reveals that sodium treatment of activated carbon, which is known to increase the material's ability to adsorb inert gases, also improves its liquid adsorption characteristics.

For the binary mixture n-heptane with toluene for example, toluene adsorption is increased from 48% to 58%. For n-heptane with propyl sulfide, adsorption of the latter material climbs from 25% to 85%.

The activated carbon is treated by stirring it with molten sodium until a homogeneous mixture is formed. Selectivity of the carbon is not altered.

The research group believes that sodium treatment causes small gaps to form between the carbon sheets which are generally thought to make up the structure of activated carbon. These gaps, probably made by sodium atoms wedging between the carbon sheets, give the carbon structure a honeycomb appearance. A much larger surface is thereby produced for liquid or gas adsorption.

U.S.I. Pulp and Paper Lab Expands to Cover More Bleaching Problems

Technical Service Work Now Emphasizes Use of Chlorine and Caustic Soda in Multi-Stage Bleaching of Kraft. Studies on Sodium Peroxide Bleaching Continue.

U.S.I.'s pulp and paper laboratory at Ashtabula, Ohio, established over eight years ago to provide technical service assistance on pulp bleaching with U.S.I.'s sodium peroxide, has been expanded, with the staff now working on problems relating to the use of U.S.I. chlorine and caustic soda in the multi-stage bleaching of wood pulp.

These technical service facilities are typical of the best industry laboratories maintained by pulp and paper companies themselves. Therefore, U.S.I. is able and willing to handle requests for comprehensive evaluations and recommendations on bleaching systems, techniques and chemicals—usually aimed at achieving the brightest pulp with the minimum degradation in fiber strength.

How Pulp & Paper Lab Functions

In a typical call, W. F. Schroeder, who has a very extensive background and acquaintance with the paper trade, visits a mill, examines the bleaching operation and takes pulp samples back to the laboratory.

MORE

Polyurethane Foam Radome, First Ever Built, Now Under Test in Canada

In a program designed to provide ground shelters with greater dielectric "transparency" —to minimize energy loss and boresight error in radar tracking installations—the world's first polyurethane foam radome has been built and is under test by Canada's National Research Council.

The polyurethane dome is undergoing an extensive series of electronic tests using actual field radar equipment. From these electrical analyses, NRC expects to obtain data indicating the suitability of such foam for radar at the frequencies involved. Favorable results could lead to extensive use of such foam, particularly for missile tracking in anti-missile type radar systems.

Chlorination of kraft pulp on a laboratory scale in fume hood at U.S.I.'s pulp and paper lab, Ashtabula, Ohio. W. H. Schroeder has obtained a sample of filtrate for residual chlorine analysis. J. R. Leidich is checking weight of chlorine added to pulp.

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U.S. Industrial Chemicals Co.*

April 23 ★ **U.S.I. CHEMICAL NEWS** ★ 1960

CONTINUED

Paper Laboratory

There the samples are bleached under a variety of conditions in a trial program based on knowledge of individual requirements and experience with many types of pulps. The bleached pulp samples are then made into hand sheets and tested for brightness and other necessary characteristics in a constant temperature, constant humidity testing room. Heat-aging studies can also be conducted. After all variables have been examined, a process is recommended for obtaining a bleached pulp that combines maximum brightness with maximum strength.

In the multi-stage bleaching of kraft—which usually involves treatment with chlorine, followed by caustic extraction and several whitening stages using bleaching agents such as hypochlorite, peroxide or chlorine dioxide—conditions of time, temperature, pH and pulp and chemical concentrations must be carefully worked out. U.S.I. technical service engineers are qualified to evaluate all the variables, including the type of equipment used.

U.S.I. interest in pulp bleaching arises from its sodium peroxide plant at Ashtabula, Ohio, and its two chlorine and caustic soda plants at Huntsville, Alabama. Further information on the pulp and paper technical service laboratory may be obtained by writing to U.S.I., 99 Park Avenue, New York 16, N. Y.

W. H. Schroeder determines brightness of a pulp handsheet on Hunter Multipurpose Reflectometer at U.S.I.'s pulp and paper laboratory.

Polyethylene Is Used For Radiation Shields

Polyethylene radiation shields, so thick they must be cut by specially designed saws, are being produced for use on atomic powered vessels. These polyethylene panels are intended to provide excellent protection from neutron bombardment and are lower in weight than conventional materials such as concrete and lead. The hydrogen nuclei in the polyethylene serve successfully to reduce the energy in the high energy neutrons created by atomic fission. A small quantity (1 or 2%) of boron, compounded with the polyethylene, absorbs the remaining low energy neutrons.

The polyethylene panels must meet rigid specifications and require critical quality control. They are made by a specially adapted extrusion technique which allows production of heavy gauge sheets. The shields can be made in standard widths over 36 inches and may be cut to any length according to specifications.

PETROTHENE® 100, a polyethylene resin supplied by U.S.I., is used to make the panels because of its ideal processing characteristics and because it passes all military specifications for radiation shielding.

Solox® Solvent Covered In New U.S.I. Data Sheet

Complete technical data on U.S.I.'s ethyl alcohol proprietary solvent SOLOX are given in a new, six-page data sheet. SOLOX frequently can be used in place of specially denatured alcohols because of its general utility and excellent solvent qualities. The permit and bond required for S. D. alcohols are not needed for SOLOX. It is noncorrosive, burns with a clean, colorless flame, leaves no residue and has a mild, nonresidual odor.

The new data sheet includes specifications, properties, compositions of the five SOLOX proprietory solvent formulations, and shipping information. Applications in lacquers, shellacs and varnishes, in the textile field, in chemical manufacturing, in cleaning compounds, as a fuel oil conditioner, in photography and as a fuel are described.

Government regulations pertaining to SOLOX complete the data sheet. Copies may be obtained from U.S.I. sales offices or from the New York office at 99 Park Avenue.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Protective coating systems for concrete floors compared in new coating chart. Gives resistance of each system to chemicals, thermal shock, abrasion, temperature. Shows compressive strength, impact resistance, skid properties. **No. 1580**

Silicone products for antifoams, release agents, lubricants, cosmetics, polishes, water, repellents, paints, textile finishes and electrical insulation described in new bulletin. Silicone rubber compounds also covered. **No. 1581**

New hydrogen analyzer uses hot extraction principle to determine content of the gas in metals. Said to be compact, inexpensive, and to combine speed and accuracy with ease of operation. Used for checks, controls, studies. **No. 1582**

Blowing urethane foams with fluorinated hydrocarbons discussed in new brochure. Includes advantages of making foams this way; uses of urethane foams; physical properties of blowing agent, many foamed plastics, other insulation. **No. 1583**

Latest developments in cast polyethylene film described in new booklet which deals with film casting equipment such as chill rolls and dies, and gives a comparison of properties among cast, quenched and blown films. **No. 1584**

New miniaturized infrared gas analyzer is said to be smaller than portable TV set, to weigh only 30 pounds, to accurately measure and control furnace atmospheres, dew point, combustion, toxic and combustible gases, chemicals. **No 1585**

Two new thread sealants for storable rocket propellant systems are now available, one for nitrogen tetroxide (N_2O_4) and the other for unsymmetrical dimethyl hydrazine (UDMH). Neither is impact-sensitive in these propellants. **No. 1586**

Ozone chemistry and technology covered in collection of 60 papers presented at International Ozone Conference, now being sold. Ozone now tool for organic, analytical and photo chemists, meteorologists, plant physiologists. **No. 1587**

New gas chromotography analyzer, incorporating advanced developments such as Golay columns and ionization detectors, has been introduced. Detectors permit accurate measurement of sample components in the minute quantities resolved by the Golay column. **No. 1588**

Radioactive carbon-14 compound adenosine-8-C14 now available is a radioactive purine valuable in chemistry, biology, pharmacology. Useful in study of carbohydrate metabolism since it is a constituent of plant and animal nuclei. **No. 1589**

PRODUCTS OF U.S.I.

HEAVY CHEMICALS

Caustic Soda, Chlorine
Sodium, Metallic: cast solid in tank cars, steel drums, pails; bricks in barrels, pails.
Phosphoric Acid, Fertilizer Grade
Ammonia, Anhydrous: commercial & refrigeration. Tank cars or tank wagons.
Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions
Sulfuric Acid: all strengths, 60 Baume to 40% Oleum. Also Electrolytic grade to Federal specifications. Tank cars or tank wagons.
Sodium Peroxide

OTHER PRODUCTS

PETROTHENE® Polyethylene Resins

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.
Ethyl Alcohol: Pure and all denatured formulas; Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL PR.
Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide. Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.
Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

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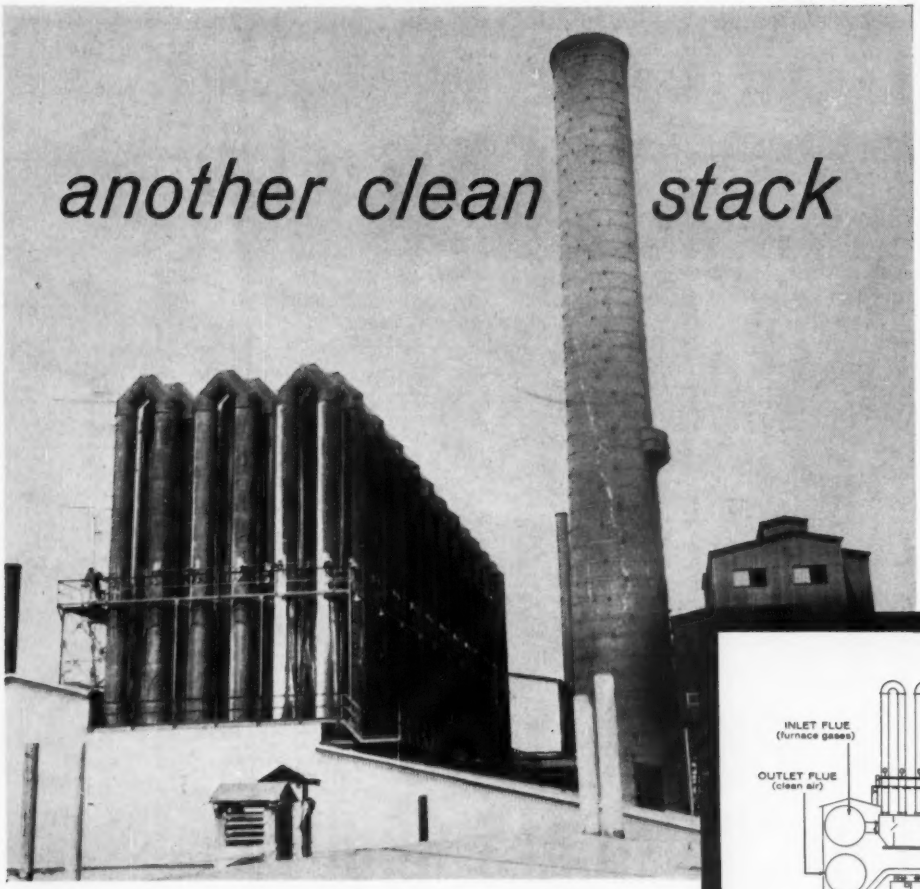
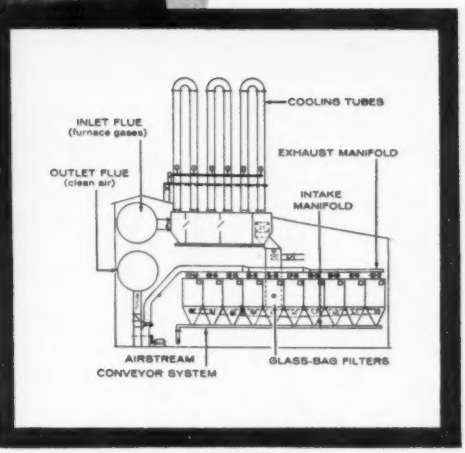


(Left) Cooling tubes atop Glass-Bag Filter housing lower furnace gas temperature from 800°F. to 450°, a full 150° below maximum advisable operating temperature. Clean stack proves that filter removes all visible dust.

(Below) System consists of 12 ten-compartment Glass-Bag Filters. Gases at 800° are blown from electrostatic precipitator to cooling tubes which discharge to filter system, resulting in daily collection of about 35 tons of material.



. . . "trade mark" of the Dracco Glass-Bag Filter

Freedom from hot, corrosive dust created by metallurgical processes is one of the many benefits of using Glass-Bag Filters. The clean stack shown in the unretouched photograph testifies to the effectiveness of the Dracco system at Hudson Bay Mining & Smelting Co., Ltd., Flin Flon, Manitoba.

Here is what the system does for Hudson Bay:

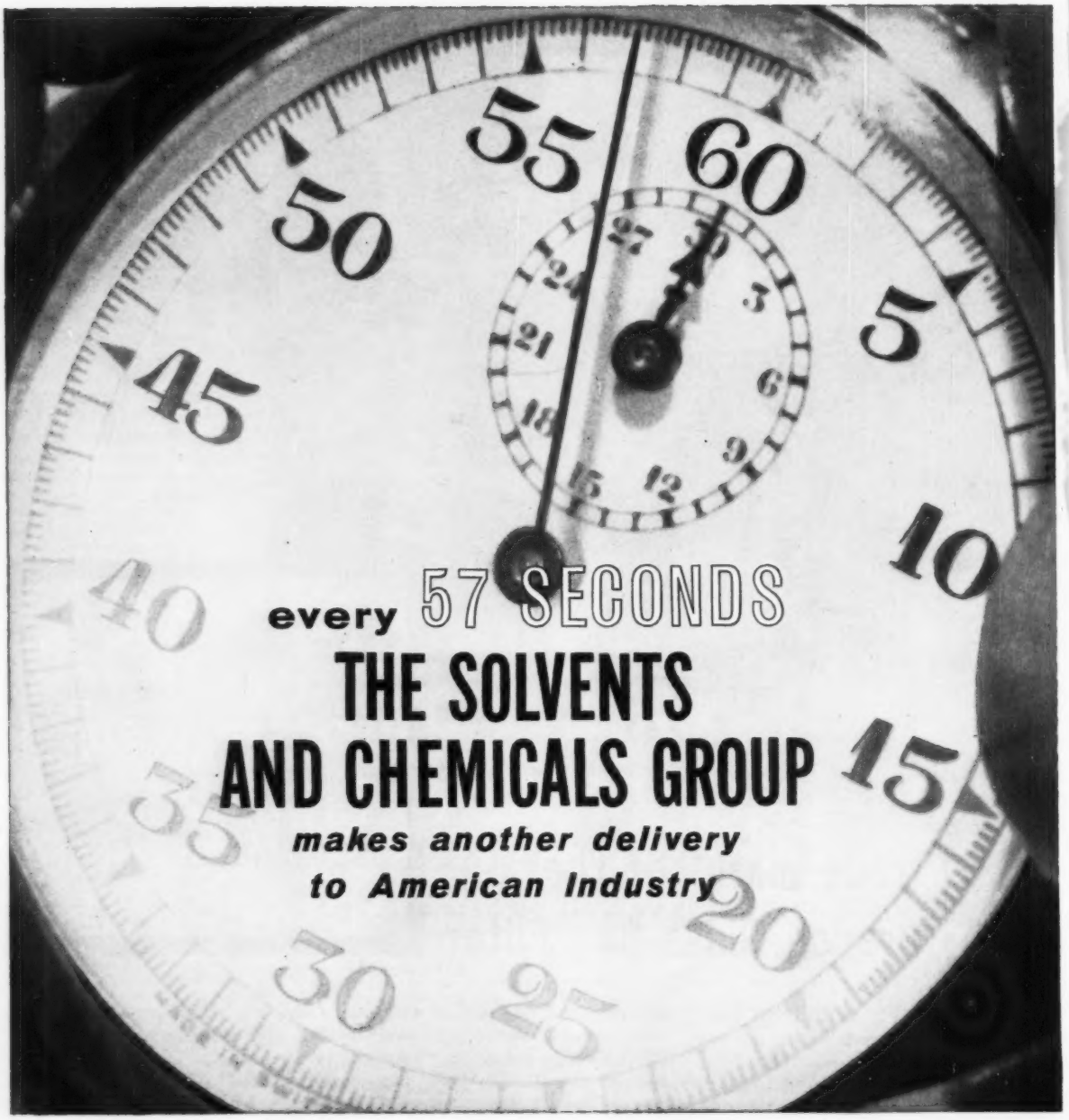
- **handles 450,000 cfm of mixed reverberatory furnace and converter gases at 450°F.**
- **recovers approximately 35 tons of valuable metal oxide dusts daily.**
- **maintains operating temperature to prevent condensation of exhaust gases and formation of corrosive acid dews.**
- **eliminates air pollution**
- **reduces cooling equipment requirements, and costs, by 50% over conventional methods.**
- **provides low-maintenance operation and gentle bag cleaning with SWING-CLEAN.**

Glass-Bag Filters, the most advanced equipment now available for fighting air polution and hot dust, have been proved-in-performance in the metallurgical, chemical and cement industries. Virtually 100% collection efficiency is maintained at temperatures to 600°F. Maximum bag life is assured by either of two patented cleaning devices: (1) a mechanism for dust removal by sonics and (2) SWING-CLEAN, gentle swaying action.

For full details on how Glass-Bag Filters can help you lick that hot dust problem, write: Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors
dust control equipment

FULLER COMPANY



You can depend on prompt delivery from The Solvents and Chemicals Group . . . high-quality products from America's leading producers—**when you need them.** Whether you order in drum lots, tank truck or tank car quantities, 19 "local" Solvents and Chemicals Group plants and stock points can deliver the "goods"—**on time!** Our on-the-spot storage facilities, specialized transportation equipment and genuine interest in your business assures meeting the most exacting delivery schedules. Make The Solvents and Chemicals Group **your** single, economical source of supply for ——————→

Aliphatic Petroleum Naphthas, Alcohols and Acetates, Alkanolamines, Petroleum and Coal Tar Aromatic Solvents, Chlorinated Paraffins, Chlorinated Solvents, Glycerine, Glycols and Glycol Ethers, Ketones and Esters, Plasticizers, Resinates, Rosins, Terpene Solvents, Waxes.

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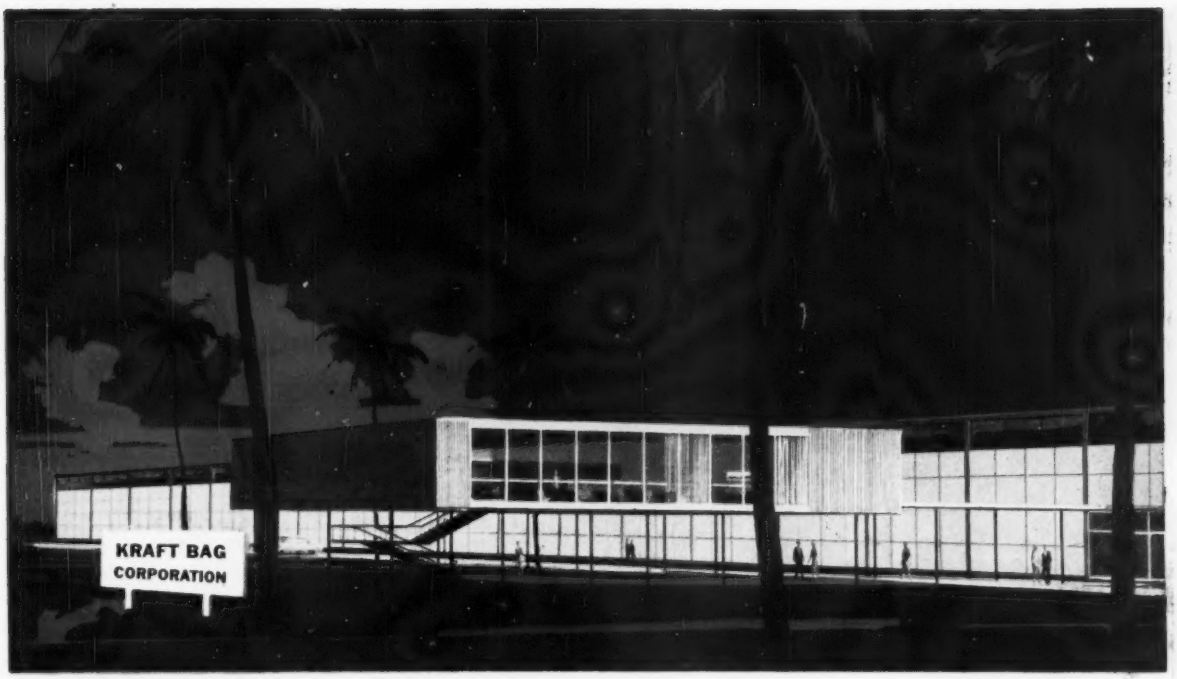


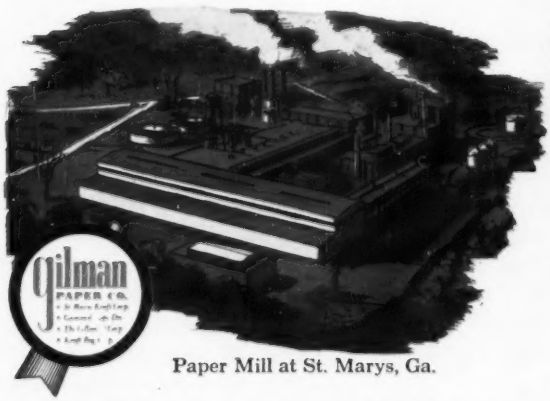
"It wasn't there last year!"

This is the new 300,000 sq. ft. addition to Kraft Bag Corporation's converting plant at St. Marys, Georgia, scheduled to go "on stream" in February.

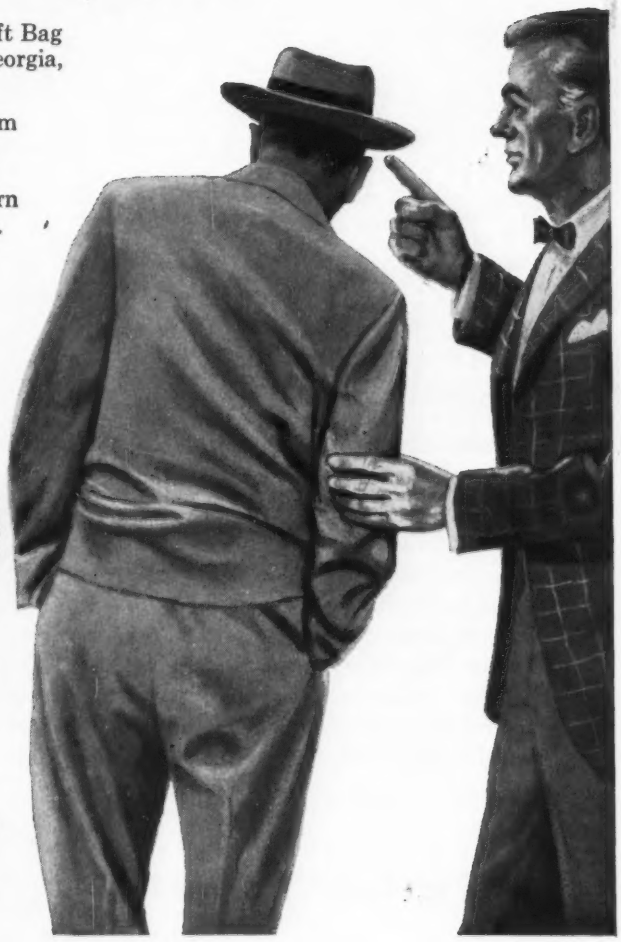
Here, in one giant integrated operation, logs from our own forest lands are turned into pulp, then into paper, and finally into heavy duty multiwall shipping sacks, using the most modern machinery and equipment the industry affords.

This expansion of our facilities is one more step in our constant efforts to provide our customers with the best in quality and service.

We invite your inquiries.



Paper Mill at St. Marys, Ga.



KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

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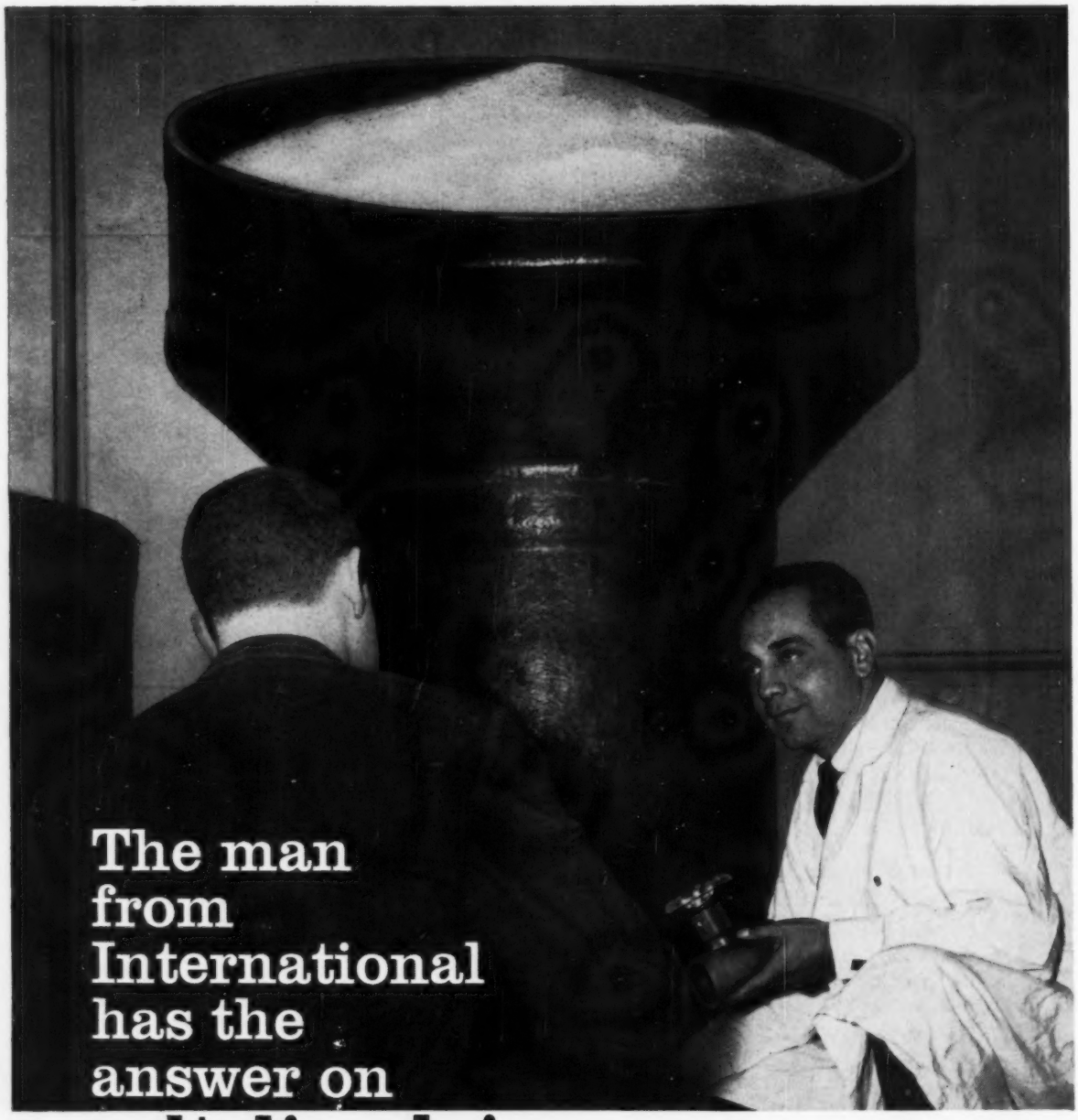


The man from International has the answer on salt dissolving

Here, the man from International Salt Company checks the rate of flow of a newly installed plastic Sterling Lixator* as his customer looks on, smiling. Reason for the smile: he's thinking of the time and money he'll save, thanks to this new salt-dissolving system. The exclusive Sterling Lixator is the most efficient and economical rock-salt dissolver ever developed. It simplifies the entire brine-making process, combining salt-storage, dissolving and brine self-filtration in one *automatic* operation. Lixate Brine is crystal-clear, fully saturated—and the only source of power used to produce it is gravity—which costs nothing. For expert advice on the particular Lixator for your needs, contact International Salt Company, headquarters, Clarks Summit, Pa. District offices: Boston, Buffalo, Charlotte, Chicago, Cincinnati, Detroit, Newark, New Orleans, New York, Phila., Pittsburgh, St. Louis.

*Registered T.M. of International Salt Company

INTERNATIONAL STERLING SALT SALT COMPANY

"A STEP AHEAD IN SALT TECHNOLOGY"

ISOBUTYL ACETATE SAVED LACQUER MANUFACTURERS OVER $41,200 IN THIS AREA LAST YEAR

How much can you save with this economical solvent?

A switch from n-butyl acetate to Eastman Isobutyl Acetate saves you 14¢ on every gallon, or more than $1,100 on an 8,000 gallon tank car.

A medium-boiling solvent, Isobutyl Acetate can be used interchangeably with butyl acetate in most formulations. Its substitution in nitrocellulose lacquers produces virtually no change in film properties or handling characteristics.

Replaces methyl isobutyl ketone

Substituting Isobutyl Acetate for MIBK means a saving of 5¢ per gallon ($400 per tank car) and helps you obtain better blush resistance.

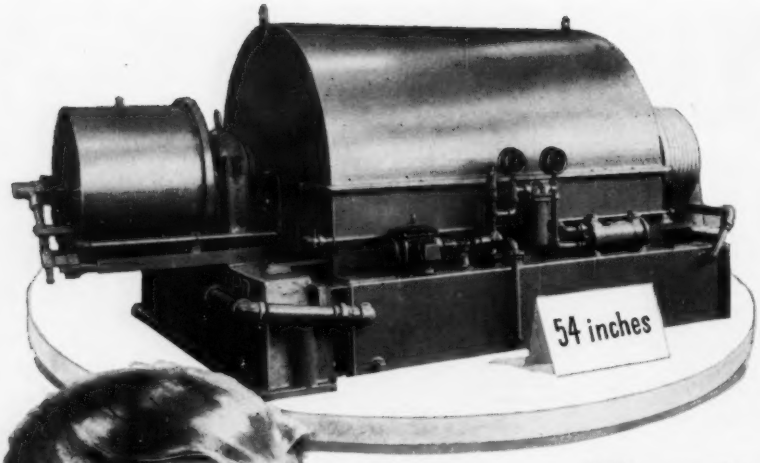
Eliminates solvent blends

Using Isobutyl Acetate alone, the cost per gallon will in all likelihood be less than that of any usable combination of butyl acetate with sec-butyl acetate or propyl acetate. In addition, you free a storage tank for other purposes.

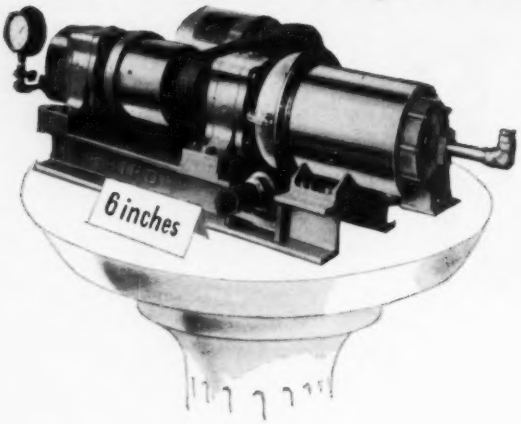
Your Eastman representative will be glad to show you how you can reduce your solvent costs with Isobutyl Acetate. Write to our nearest sales office or to EASTMAN CHEMICAL PRODUCTS, INC., Chemicals Division, KINGSPORT, TENNESSEE.

Eastman
CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE
subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.



How to pick the Right Bird for Your Solid-Liquid Separation



FEED SLURRIES VARY IN

- **volume**
- **consistency**
- **solids particle size**
- **character of liquid**
- **temperature**

Often the slurry may vary in solids content and in volume during the separating operation.

The right BIRD for the job takes all these variables into account and runs *continuously* with minimum attention, minimum maintenance (no vacuum, no filter media, no auxiliaries), in minimum space at minimum cost per ton.

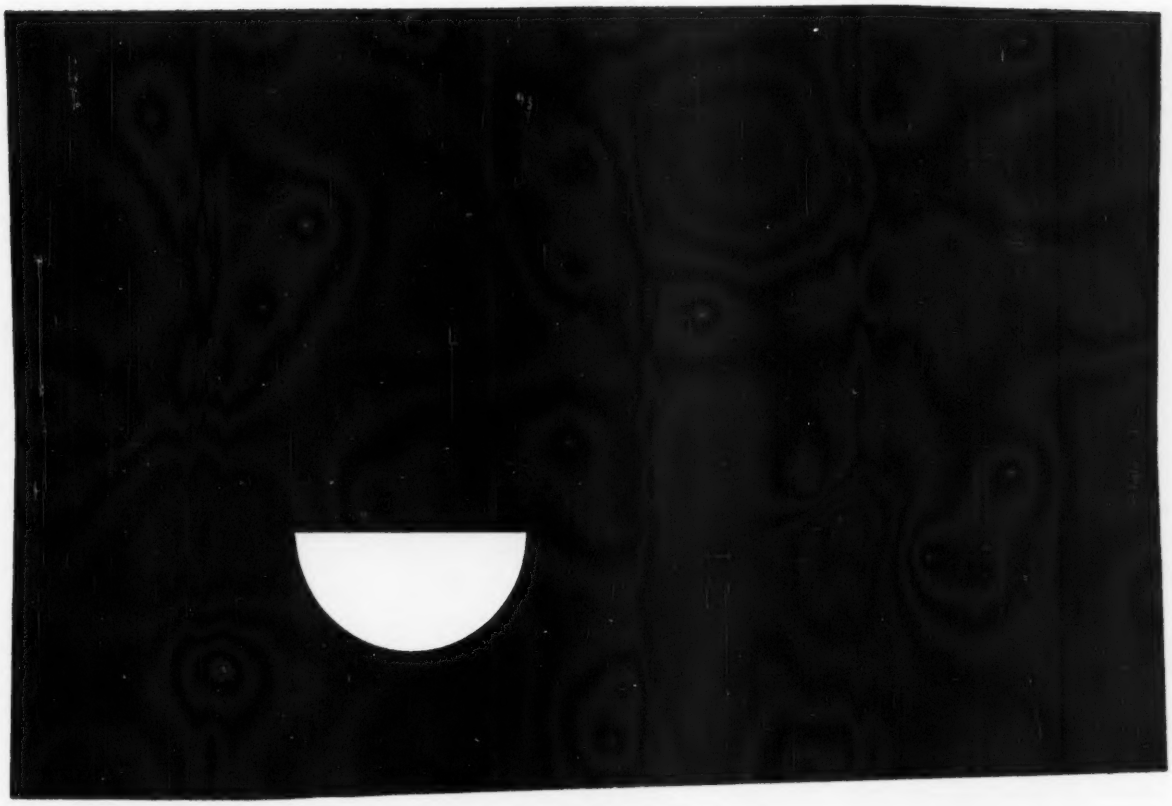
To make certain you get the right one for *your* slurry, *your* solids dryness and filtrate clarity requirements, we build 'em in seven sizes and twenty-five design variations for each size. Then we provide unequalled application engineering experience backed if need be by pilot-scale test at the Bird Research and Development Center.

You'll know *in advance of your investment* that the Bird we recommend is the one best unit for the job. We build vacuum filters, batch centrifugals and pressure filters, too, so our recommendations will be completely objective and unbiased.

THE BIRD MACHINE COMPANY • SOUTH WALPOLE, MASS.

Regional Offices: EVANSTON, ILL. • ATLANTA, GA. • HUNTINGTON, W. VA. • LA PORTE, TEXAS • ALAMO, CALIF.

THE BIRD CONTINUOUS SOLID BOWL CENTRIFUGAL



Looking toward tomorrow, visualizing the shapes and courses it will take, anticipating its needs . . . this search for ways to serve industry better and more fully has been an unremitting spur to Sonneborn, since many tomorrows ago. Inasmuch as this quest dates back to the turn of the century and has been concentrated upon a specialized segment of petroleum refining, it is not surprising that in products, technical assistance, service, Sonneborn Goes Further.

SONNEBORN CHEMICAL AND REFINING CORPORATION

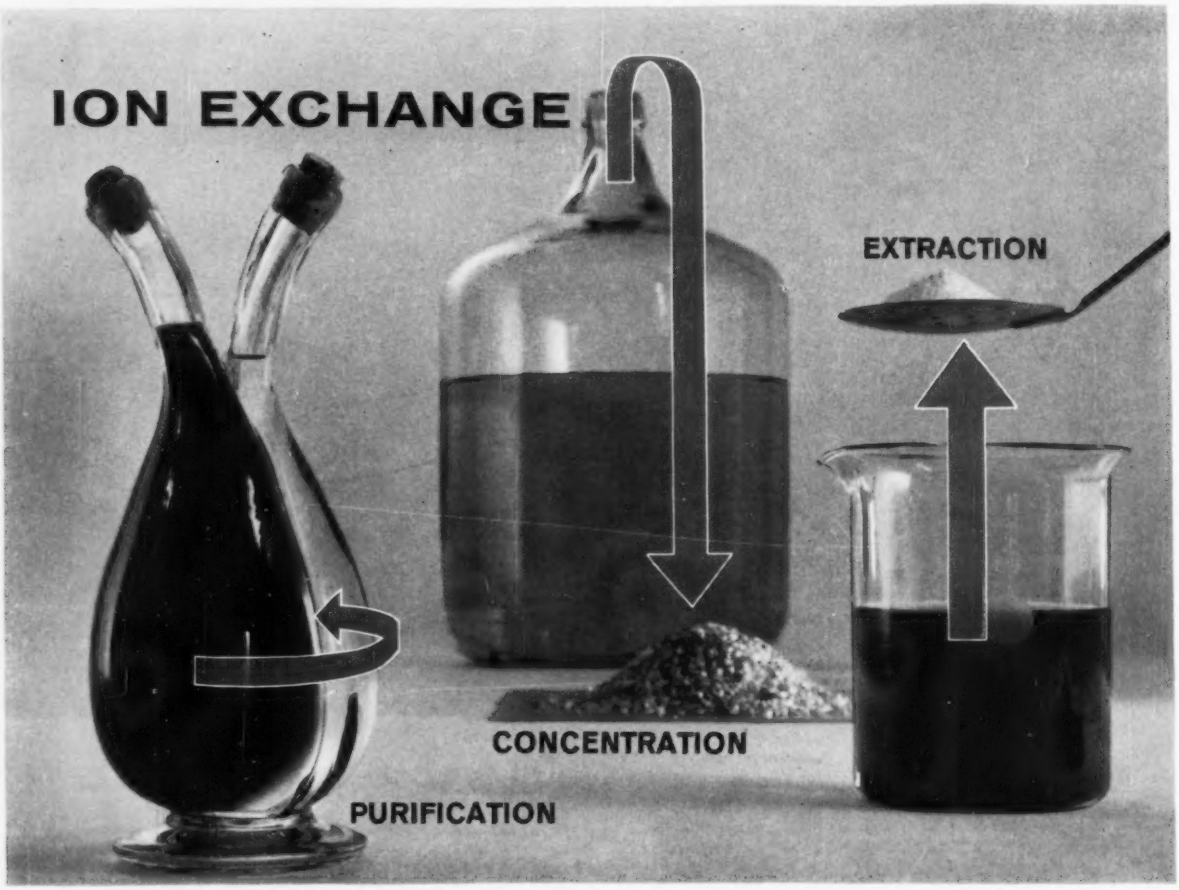
White Oil Division, 300 Park Ave. South, New York 10, N.Y.

SPECIALISTS IN PETROLEUM SULFONATES (PETRONATES) • WHITE MINERAL OILS • PETROLATUMS

WO-3

We have changed our name from L. SONNEBORN SONS, INC. to SONNEBORN CHEMICAL AND REFINING CORPORATION

FLUIDICS AT WORK



0.1% in solution . . . how to handle practically and profitably . . . consider Permutit Ion Exchange

Ion exchange, the Permutit way, is a standard, unit operation for: Purification, Concentration, Separation and Addition.

It is a versatile process involving many types of dilute solutions.

Unified responsibility. As with any unit operation, success is related to coordination. In the case of ion exchange at Permutit, this encompasses conceptual system design, process engineering, equipment design and fabrication, and service of the completed installation.

Not the least is the ion exchanger employed. As the only manufacturer of both resins and equipment, Permutit is best able to control the ion exchange operation from beginning to end.

You get this complete, unified approach when you work with Permutit. Pioneering the field since 1912, Permutit offers a fund of ion exchange technology, equipment and resins, unmatched by any other group.

Rely on any or all of our services:

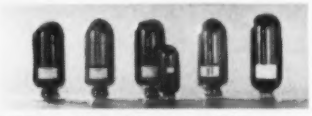
1. Technical assistance. Your problem and process will be thoroughly and expertly evaluated in terms of what ion exchange can do.

2. Wide choice of resin. From among Permutit's more than 30 ion exchangers, those best suited for your needs will be specified. In this wide selection you'll find many unique and specialized cation and anion exchangers, mixtures and miscellaneous adsorbents.

3. Dollar-saving equipment. Frequently the equipment you need is already available as a "package" or can be quickly assembled from standard, stocked components. Naturally, custom units are also part of our service, and automatic equipment was pioneered by Permutit.

FLUIDICS and you. This total approach is part of Fluidics at work—the Pfaudler Permutit program that applies the science of fluid processes to profitable solutions for problems involving liquids or gases.

If you're interested in ion exchange, either (a) send for a 12-page booklet, "Permutit Ion Exchangers" or (b) send us an outline of your problem. Write to our Permutit Division, 50 West 44th Street, New York 36, N. Y.



OVER 30 ION EXCHANGE RESINS are available from Permutit, along with the know-how and equipment that can help you get the most from this recognized unit operation. Samples on request.

FLUIDICS AROUND THE WORLD

Pfaudler Permutit is a world-wide company with manufacturing plants in Germany, Great Britain, Canada, Mexico, Japan and four in the United States.

PFAUDLER PERMUTIT INC.

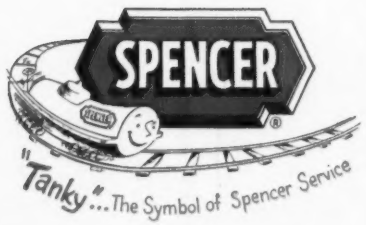
Specialists in FLUIDICS...the science of fluid processes

"I must have intercepted one of their code messages, General Custer. It says 'Spencer Service Is Wonderful'."

Write for your free copy of Spencer Chemical Company's 16-page Nitric Acid Booklet.

NEED NITRIC ACID?...

You can be sure of getting fast, dependable nitric acid service when you contact Spencer Chemical Company. Spencer produces nitric acid in four specific gravities—36°, 38°, 40°, and 42° Baumé. Get the complete facts by writing for Spencer's Nitric Acid Booklet. A copy will be sent you without obligation.



SPENCER CHEMICAL COMPANY

America's Growing Name in Chemicals

SPENCER PRODUCTS: Ammonia (Commercial, Refrigeration and Metal Treating Grades) • Aqua Ammonia • 83% Ammonium Nitrate Solution • Prilled Ammonium Nitrate • Argon • Methanol • Formaldehyde • Liquid CO_2 • Nitric Acid • Uranium Nuclear Fuels

GENERAL OFFICES: Dwight Bldg., Kansas City 5, Missouri

DISTRICT SALES OFFICES: 575 Lexington Ave., New York City; First National Bank Bldg., Chicago, Illinois

The Arithmetic of Materials Handling

Fuller Airveyor unloads wood flour to two forty-five foot silos. Second Airveyor system reclaims material 360 feet to processing.

General Electric Changes From Bags to Airveyor ... Cuts Handling Costs 60%

As part of a program to increase plastics production and reduce operating costs at its Pittsfield, Mass. plant, General Electric Company called in Fuller engineers to design systems for handling wood flour in bulk.

Wood flour—used as a filler in phenolic molding compounds—was being handled in 75 and 100-pound bags. Unloading one carload of bags required 16 manhours. Bags were loaded on dollies and wheeled to a distant elevator.

SAFETY FIRST—The two pneumatic Airveyor® materials handling systems, engineered and manufactured by Fuller Company, were installed by its parent company, General American Transportation Corp., providing undivided responsibility. This installation resulted in a 60% saving in handling costs! The two systems are handled by one full-time and one part-time operator. Manhours to unload one car have been reduced from sixteen to six!

In addition, all equipment is designed to conform to strict safety specifications set down by G-E engineers.

FLOW *YOUR* MATERIALS—The Airveyor is a system that flows your material through sealed pipes. It's fast, safe, and self-contained. The pipes can be placed close to ceilings, run underground or through walls.

Whether you process wood flour—or other dry granular materials—look into the many economies of Airveyor conveying. Write today for interesting, detailed literature on Airveyor and other Fuller pneumatic materials handling systems.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

Fuller
....pioneers in harnessing AIR

FULLER COMPANY
144 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

G-196
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"See Chemical Engineering Catalog for details and specifications".

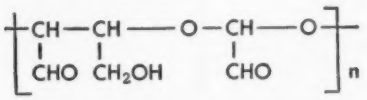
MILESTONES IN CHEMISTRY

published by Miles Chemical Company, Elkhart, Ind.

Old friend, new talents

About the same time the alchemists were run out of town, the selective oxidation of 1, 2-glycols by periodate ion was discovered.

And back during Roosevelt's second term, two fellows name of Jackson (Ernest L.) and Hudson (C. S.) applied the technique to starch. They established the formula of the product resulting from this specific oxidation. It went like this:



And there it sat for some 15 years. Every now and then someone would put it to use for structure studies. But the reaction stayed snugly in the area of laboratory interest.

Some 15 years later, Dvonch and Mehltretter of the Northern Utilization Research Branch, U.S.D.A., took this neglected treasure and did something with it. Specifically, they made practical an electrolytic technique whereby the periodate oxidant was continuously regenerated *in situ* from the iodate formed. This effectively overcame the limitation of high-cost periodic acid.

In short, they lowered cost to the point where a businessman could afford to experiment with it. That's where Miles Chemical Co. entered the scene. Read on to find out what happened.

SUMSTAR™ versatility

Miles had more than a passing knowledge of electro-organic chemistry. What's more, the Dvonch-Mehltretter patents showed the way to a product of unusual structural versatility . . . the sort of one-man band traits that promised many interesting applications.

There followed some intensive research and development, out of which came the first commercialization of a process for dialdehyde starch. Product trade name: SUMSTAR.

SUMSTAR is produced at three levels of oxidation. SUMSTAR-S is over 90% oxidized. SUMSTAR-R is 75-80% oxidized. SUMSTAR-J is 50% oxidized. All three are fine powders, nonvolatile, and virtually odorless. Acute toxicity is only a fraction of that of other commercially available aldehydes.

Frankly, SUMSTAR is so new that we don't know where-all it will prove of value. So far, the tracks lead to excellent possibilities in adhesives, leather, tobacco, plastics, and paper. It appears that SUMSTAR opens up limitless vistas for new products and modifications of your present products. Many synthetic and natural materials can be cross-linked to varying degrees by using SUMSTAR. Key to the whole thing is the manner in which the highly specific periodate ion breaks the carbon-to-carbon bond between the second and third carbon atoms of the anhydroglucose units of the starch molecule, forming two aldehyde groups.

Some of the things we know about SUMSTAR are in our bulletin No. 6-129. This bulletin and samples are available on request. Just write.

Build you a molecule?

Every now and then every chemical company has the urge (or need) to do violence to its everyday inventory of molecules. And frequently this calls for the use of a unit process which can't be handled with the existing plumbing.

That's where Miles Chemical Co. may be a handy friend. The Zeeland, Michigan, plant has the facilities and people needed to carry through some 18 unit processes with dispatch.

These include: reduction (catalytic and chemical), reductive amination, oxidation, electro-organic synthesis, Friedel-Crafts, Kolbe, Claisen, and other classical reactions, esterification, distillation, acylation and alkylation, resolution of optical isomers, amination, halogenation, and cyanation.

Knowing the economics of this business as well as you do, it's easy to see why we're not eager for small-batch custom work. But frequently we've found folks we can work with to mutual benefit. If it looks like that's the situation in your case, let's get together and talk about it.

Can Miles speed you to your next milestone?

There are several ways in which Miles Chemical Co. has been able to help customers reach their goals a little faster.

First of all, Miles produces an interesting range of useful products. These include citric acid U.S.P., a series of antioxidants, SUMSTAR (dialdehyde starch), several interesting aromatic amines, and many other products in the fine chemical area.

Secondly, Miles has the facilities and the resourceful people to take on projects which involve tailoring existing products (yours or ours) to fit special needs.

Finally, your problem never becomes lost in a corporate maze at Miles. You work with an eager, inventive group of experienced research and development people . . . all anxious to speed your progress to your next milestone. Get in touch and see what we have to offer.

Miles Chemical Company

division of Miles Laboratories, Inc.

Elkhart, Indiana

Telephone: COngress 4-3111

6-60

The KETONE FAMILY

1

ACETONE—low-boiling solvent that permits high solids concentration, particularly useful in high-low lacquer systems. Good for paint and varnish removers.

2

MEK—low-boiling, strong solvency for all resins used in lacquer. Gives low viscosity solutions, high solids concentration, high diluent tolerance.

3

MIBK—medium-boiling with excellent solvency characteristics. Has high tolerance for diluents. Gives solutions of low viscosity and high solids concentration.

4

DAA—high-boiling solvent that improves blush resistance. Excellent for hot lacquers. Ideal for decorative brushing lacquers because of mild odor.

5

EAK—high-boiling solvent, excellent blush resistance, good diluent tolerance, and high solvency for surface-coating materials. Slow evaporation contributes to good flow-out, prevents pinholing and bubbling.

Now—the standard of comparison for lacquer solvent systems . . .

Ketone solvent systems have become the standard of excellence in lacquer technology against which all other systems are measured.

There are very good reasons why this is so. For example:

Ketone solvent systems give superior finishes in almost any formulation at lowest cost. Ketones yield solutions of higher solids or permit greater diluent content with either aromatic or aliphatic solvents. In addition, ketone-based solvent systems assure complete flexibility in formulating. When you buy high-purity solvents from Shell, *you* add the latent solvent *you* prefer.

High-purity, active solvents available from Shell include: acetone, MEK, MIBK, DAA, EAK, as well as latent solvents MIBC, IPA, and industrial ethyl alcohols. Shell also provides technical assistance—backed by years of experience and one of the world's best-equipped surface coatings laboratories.

For information on solvents—or help with formulation problems, write or phone your nearest Shell Chemical office.

SHELL CHEMICAL COMPANY

INDUSTRIAL CHEMICALS DIVISION

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SHELL

Business
Newsletter

CHEMICAL WEEK
April 23, 1960

Ashland Oil and Refining's petrochemical plans shifted suddenly this week. Its synthetic benzene and naphthalene plant, previously scheduled to go up at the refinery of its subsidiary, Frontier Oil, in Tonawanda, N.Y., will now be built next to Ashland's much larger refinery in Catlettsburgh, Ky.

As now planned, a $5-million plant with capacity of 75 million lbs./year of naphthalene and 15 million gal./year of benzene will be built. Early this year, the company's plans were for a 50-million-lbs./year naphthalene unit and 12-million-gal./year benzene facilities at Tonawanda (*CW Business Newsletter, Jan. 2*). A month later (*CW, Feb. 20, p. 26*), the company said substantial capacity increases were planned.

The Frontier refinery is still being considered for a "smaller plant," however—about 10 million gal./year benzene, with provision for naphthalene conversion. Action on this, spokesmen report, will be delayed. Meanwhile, Ashland officials decline comment on reason for the big switch.

•

Commercial facilities for production of tetramethyl lead are being rushed by Ethyl Corp., at its Baton Rouge, La., facilities. The company has been researching gasoline additives such as TML and mixtures of tetramethyl and tetraethyl for a long time; it will also produce trimethyl phosphate at the expanded Baton Rouge facilities. TMP, an ignition control compound, the company says, yields more phosphorus per pound of product, and raw materials for it are less expensive than for existing phosphate additives. Date of startup was not disclosed.

•

Three new projects to look for:

• Standard Oil (Indiana) admitted late last week that it is considering, along with other firms, a possible tie-in with Canada's giant project to pipe liquid hydrocarbons to the Lake Michigan area—a $150-million venture projected by Pembina Pipelines, Ltd. (*see also p. 37*).

• U.S. Rubber confirmed its interest in a Gulf Coast site for a rubber and/or petrochemical plant, but said "the project is in too early a stage to report further details."

• Goodyear's entrance into the "natural-synthetic" rubber field is expected in the near future.

•

Firestone is slating $120 million this year for worldwide construction, expansion, and modernization. In the U.S., most of its plants will be modernized; at Orange, Tex., work on its "natural-synthetic" rubber plant has started, and in Hopewell, W. Va., construction is under way on synthetic fiber and polypropylene facilities, the company's chief executive, Harvey S. Firestone, said.

Outside the U.S., manufacturing facilities at Calgary, Alta., and Bethune, France, are now under construction. To go up: synthetic rubber plants at Port Jerome, France, and Bareilly, India, with expansions slated for England, Argentina, Brazil and Venezuela.

•

Nylon yarn—for textile and industrial uses—is two steps ahead this week:

• Chemstrand, even before completion of its Greenwood, S.C., nylon-6,6 plant, now plans to increase that plant's capacity by 50%. New capacity: 15 million lbs./year. Company President Edward O'Neal wouldn't disclose the capital expenditure, but said that construction costs would not be raised 50%. Types of yarn to get the production boost were not revealed.

• Allied Chemical, which has confirmed Chesterfield, Va., as site for tripling its Caprolan heavy-denier nylon-6 capacity, said that it hopes to have selected by next week a site for its newest venture—fine-denier yarns for textile uses. Engineering studies for the plant are nearing completion. Providing technical assistance: Snia Viscosa S.p.A. (Milan, Italy).

•

Two other expansions this week:

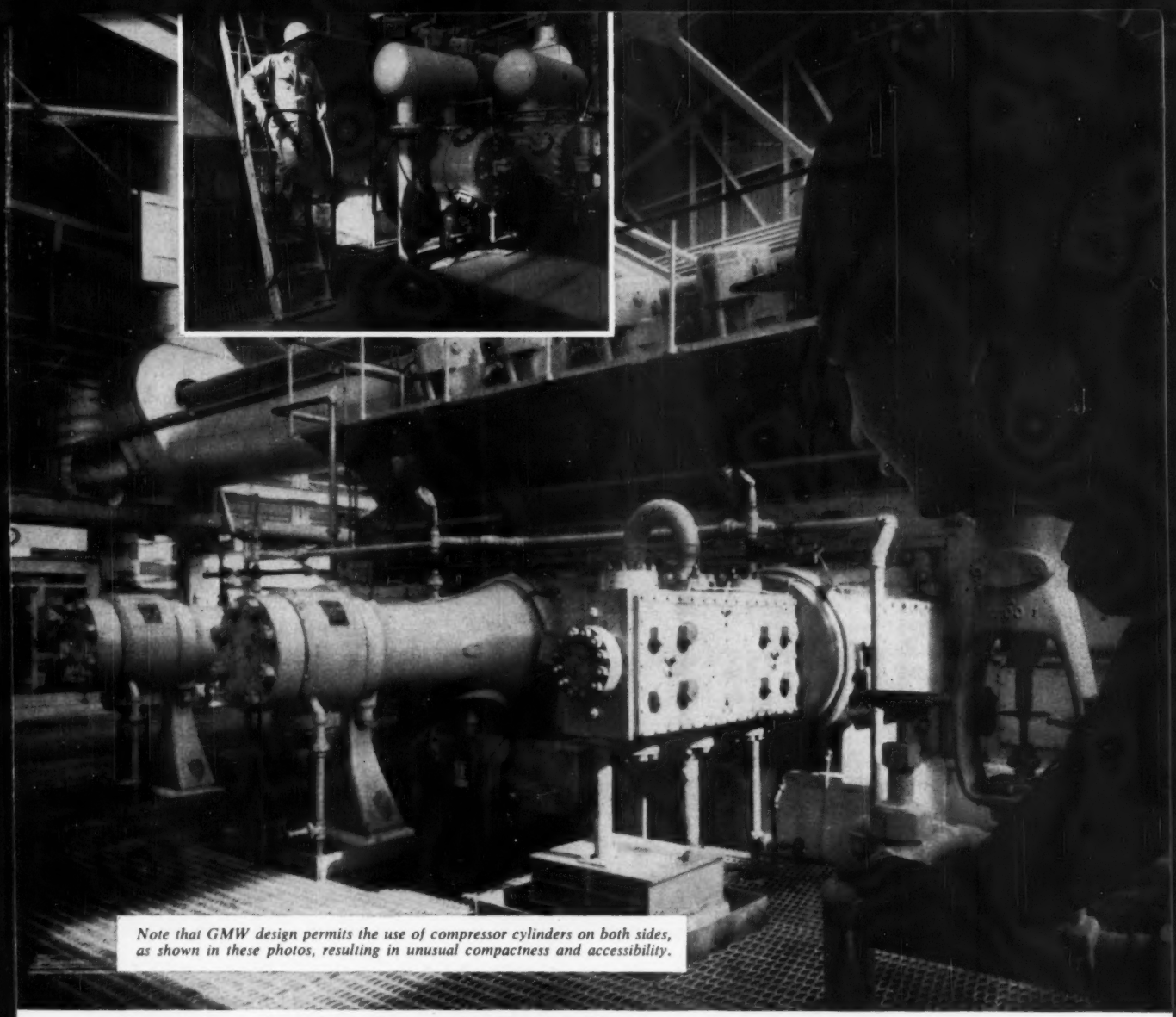
• Linde Co., division of Union Carbide, will spend $50 million to expand 16 of its U.S. oxygen plants. The move will increase Linde's total oxygen-producing capacity 4,000 tons/day. Since '55, Linde has been placing new oxygen plants onstream at the rate of one each month. Current expansions amount to more than 20% of total existing U.S. production capacity, says Linde President William Nicholson. Latest and biggest: the 1,000-tons/day high-purity oxygen plant to go onstream late this spring at U.S. Steel's Duquesne Works. The new unit will also serve three other steel facilities in the Pittsburgh area.

• General Chemical Division of Allied Chemical will put up a 50,000-tons/year wet-process phosphoric acid plant at its East St. Louis, Ill., works. It's targeted for early '61 completion, with production to be used mainly by Midwest fertilizer manufacturers.

•

First-quarter operating results have a healthy tone (*see also p. 37*).

Allied Chemical boosted sales 8.9%, to $184.2 million, and raised earnings 18.7%, to $13.5 million. Dow Chemical's sales were up 7.6%, to $182.3 million, and earnings rose 17.5%, to $16.1 million. Olin Mathieson's 2% increase in sales, to $163.1 million, helped produce a 33% rise in earnings, to $8.6 million. Hercules Powder reports a 14.5% climb in sales, to $73.5 million, and a 12.5% gain in earnings, to 64¢/-share. Metal & Thermit's sales rose 2%, to $10 million, while earnings held about even.



Note that GMW design permits the use of compressor cylinders on both sides, as shown in these photos, resulting in unusual compactness and accessibility.

Report from American Cyanamid, Fortier Plant...

How Cooper-Bessemer gas engine compressors boost synthesis gas for ammonia to 5000 psi

These photos show both sides of one of the two Cooper-Bessemer 2500 hp GMW gas engine compressors at the Fortier Plant of American Cyanamid Company, Avondale, Louisiana. In the production of anhydrous ammonia, these 4-stage units compress 6000 cfm of synthesis gas from 60 psi to a discharge of 5000 psi. The lower view shows the high pressure cylinders; that in the inset shows the low pressure side. The four stages of compression from 60 psi are (1) to 225 psi, (2) to 670 psi, (3) to 1500 psi, (4) to 5000 psi.

The two units have been operating since 1954, 24 hours a day, 340 days a year.

The anhydrous ammonia produced at the Fortier Plant is used by American Cyanamid in the manufacture of acrylonitrile and is sold to fertilizer plants and other chemical companies.

Find out how Cooper-Bessemer can help *you* plan compression and power facilities. Call the nearest office.

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Now you can make one drum do the job of two. Here's why:

★ Hercules ships you nitrocellulose in a lightweight, nonreturnable, epoxy lined drum.

★ Then you use this same drum for shipment of your paint, lacquer or varnish to your own customers.

These are the cost-saving advantages. You save on initial freight. You cut the number of drums you must handle in half. And you receive the advantages of a higher-quality drum at a cost competitive with drums of lesser standards.

Only a complete analysis of your specific requirements can determine how much this innovation in shipping technique can save you. The drums are available in two bung sizes and bung locations to meet almost any need, and a Hercules sales representative will be glad to discuss your specific applications. For further information contact your local Hercules representative or write:

Cellulose Products Department

HERCULES POWDER COMPANY
INCORPORATED

900 Market Street, Wilmington 99, Delaware

CL60-2R

Chemical Week — April 23, 1960

Merck's George Boxer spearheads studies on cancer cell flaws.

Closing In on Cancer

The chemical research attack on cancer was strongly in the news last week. At the meeting of the American Assn. for Cancer Research, in Chicago, these chemical gains were spotlighted: a new serum that protects mice against human leukemia; improved chemotherapeutic agents; and basic findings on the chemistry of malignant cells.

Key to the serum, developed by S. De Carvalho of the Rand Development Corp. (Cleveland), is ribonucleic acid (RNA) separated from cells by means of a high-speed centrifuge. The RNA serum also made mice immune to certain other types of cancer.

Sloan-Kettering Institute and Memorial Center for Cancer and Allied Diseases (New York) staffers described a new approach to cancer chemotherapy—use of three different types of drugs simultaneously. Their choice, effective against certain types of human cancer, is a combination of an alkylating agent (related to nitrogen mustard), an antimetabolite and an antibiotic (mode of action unknown). Result: relatively high potency in inhibiting growth and multiplication of cancer cells.

Eli Lilly & Co. (Indianapolis) has found that a common decorative garden shrub, the periwinkle, yields an alkaloid that helps leukemia patients. Known as vincaleukoblastine (VLB), the compound has resulted in improvement (generally of short duration) in acute leukemias, and suppression of certain solid tumors. Eli Lilly still isn't sure how useful the drug will prove, but the firm is working on analogous compounds.

Down to Fundamentals: New light on what makes cells abnormal was shed by George Boxer, reporting work at Merck Sharp & Dohme done under contract with the Cancer Chemotherapy National Service Center, National Cancer Institute, National Institutes of Health, U.S. Public Health Service.

Boxer, head of Merck's biological cancer research, found that an enzyme — glycerophosphate dehydrogenase — was missing from the malignant cells he tested. Such cells are also characterized by the presence of excess lactic acid. But when the missing enzyme is fed to the cancer cells, the lactic acid decreases, indicating that the cells are returning to normal. Now Merck is seeking to develop drugs that will accomplish this reversal in cancer victims.

Basic research in cell growth is held by many experts to be the key to future gains against cancer. Needed for this work: improved ways to grow normal human cells in test tubes. If such cells could be grown successfully, it's believed that the lengthy time required to screen hopeful anticancer drugs would be reduced. Currently these chemical agents must be tried in animals, and if found promising, will be given to human beings.

One advance in this direction was reported by Harry Eagle, of the National Institutes of Health. Eagle has grown cells in a protein-free culture medium for the first time, using protein components as nutrient. He points out that 28 chemical growth factors are known to be required for cell nutrition, but that one or more factors remain to be discovered.

So far, no positive cure for cancer is in sight. The disease will kill an estimated 265,000 in the U.S. this year. But knowledge about the causes of malignancy is increasing. Thousands of chemical compounds are now being screened routinely for anticancer activity — many of them under contract with the Cancer Chemotherapy National Service Center. Results of this cut-and-try approach, coupled with reported progress of basic chemical investigations, is raising hopes for an eventual chemical cancer cure.

Tobacco—and Its Chemicals—Unscathed by

Tobacco's Chemicals—from Seed to Smoke

TOBACCO GROWING

(1.5 million acres on 510,000 farms in 24 states)

Fertilizers:

Nitrogen content	20-50	lbs./acre
P_2O_5 equivalent	65	" "
K_2O equivalent	90-130	" "
Calcium content	50-75	" "
Magnesium content	15-25	" "
Chlorine content	15-25	" "
Boron content	0.3-0.4	" "
Total use of commercial fertilizers	1 million	tons/year

Fumigants for soil:

Ethylene dibromide, 40%	5-7½	gal./acre
Dichloropropene-dichloropropane	7½-10	" "

Insecticides:

DDT	Cryolite	Rotenone
Parathion	Lindane	Paris green
Toxaphene	Chlordane	Metaldehyde
Nitrobenzene	TDE	Pyrethrum
Lead arsenate	Tetraethyl pyrophosphate	
Barium, sodium, or potassium fluosilicate		

TOBACCO PRODUCTS MANUFACTURING

(10,000 salaried employees and 78,000 production workers in 820 establishments)

Cigarette tobacco casing materials:

Humectants (glycerine, diethylene glycol, triethylene glycol, propylene glycol, sorbitol)
Essential oils in alcohol solution

Cigarette paper materials:

Calcium carbonate (chalk)
Adhesive, starch- or casein-based

Cigarette filters:

Cellulose acetate
Alpha-cellulose

Adsorbents considered for cigarette filters:

Silica gel	Active alumina
Bentonite	Activated charcoal

Packaging materials:

Paper Foil Cellophane Adhesives

This week — despite a continuing stream of scientific reports and a nationally publicized lawsuit, all drumming at the alleged link between lung cancer and smoking — tobacco companies are calmly proceeding with major expansion projects keyed to an expected 53% sales increase in 15 years. This optimism—apparently well founded—indicates that there will be a firm and gradually growing market for the chemical products that have helped make the U.S. tobacco industry an economic success.

With the help of these fertilizers and chemicals — for which tobacco growers and processors pay in the neighborhood of $200 million/year (*table, left*)—average yield of U.S. tobacco farms has nearly doubled over the past 40 years to about 1,300 lbs./acre; productivity in cigarette factories has increased each year; and quality and uniformity of U.S. cigarettes command a premium price around the world.

Nevertheless, cigarettes and the tobacco industry are on trial—largely because of sharper public interest in the growth of knowledge about cancer (*see p. 35*). There are two moves that may crystallize this problem:

- Continuing efforts by medical researchers to define the relationship between lung cancer and cigarette smoking.
- The $1.3-million lawsuit — now being tried in the U.S. district court at Pittsburgh—in which a lung cancer victim who says he smoked for 29 years cigarettes made by Liggett & Myers is seeking judgment against the manufacturer, alleging that the cigarettes caused the cancer.

In that case, Judge John Miller has so far admitted considerable medical testimony concerning the statistical correlation between lung cancer and smoking, twice overruling the objections of the company, which is charged with negligence, breach of warranty, and false and misleading advertising.

In a sense, the whole tobacco industry is on trial with L&M. A decision against the company would be a major public relations blow, and would probably unleash a flood of similar suits. It could set a precedent for several other suits, now awaiting trial, which involve all other major cigarette producers.

'Cancer Scare'

But L&M—and spokesmen for other companies—feel that the company and the industry will come out unscathed from the trial and its publicity, that more sales records lie ahead.

There seems to be good reason for the industry's optimism. A finding for the plaintiff in the Pittsburgh suit doesn't seem likely. And if L&M, or the industry in general, suffers any ill effects from the medical testimony offered by plantiff's witnesses (L&M's stock did drop several points after the trial opened), they aren't likely to last very long.

For, despite the drumbeat of statements linking cigarette smoking to lung cancer, which have been issued by scores of scientists and organizations —even the U.S. Public Health Service — cigarette sales have been rising steadily to new highs since they dipped in '54, when the "cancer scare" started.

Last year, cigarette sales rose 4%. They're expected to go higher this year, sparked by increasing personal income, the swelling ranks of persons over 15, more women smokers. Production will rise 18% by '65, 53% by '75, the U.S. Dept. of Agriculture predicts.

Tobacco men believe that the cancer scare just doesn't frighten smokers anymore. Despite all the "noise," they and their scientific supporters say, no one has produced physical proof that cigarettes cause cancer, or has isolated a substance in cigarette smoke known to be carcinogenic.

These arguments are dismissed by critics like E. Cuyler Hammond, director of statistical research for the American Cancer Society, which has been a leading advocate in the campaign against cigarette smoking. Statistics do prove the cigarette-cancer link, Hammond insists, and, he says, the majority of the scientific community accepts this. The tobacco industry, besides disputing this interpretation of the statistics, denies that statistical correlation constitutes "proof." "Nonsense," Hammond replies. "You can't experiment on human beings with a disease like cancer, and there have actually been few cases of experimental causation of disease in the whole history of medicine."

Still, there is disagreement in the medical profession on the subject. The American Medical Assn. won't take an official position.

Even if a carcinogenic agent is isolated in cigarette smoke, this isn't likely to deter smokers. Few politicians would risk trying to stop them, or of knocking out a $6.5-billion industry that supports some 3 million people. Even the American Cancer Society, though it has "urged state and federal public health services to proceed with such public health measures as are needed for the protection of the people," maintains that the decision to smoke should be the individual's.

Instead, the society is trying to discourage smoking, particularly among teenagers, through education. Just how successful it will be is doubtful. Per-capita cigarette consumption is rising. And the rate of increase of filter cigarettes' share of total sales is slowing down, a sign that the public's primary interest is in flavor rather than "protection."

Sales Up, Profits Off

Lusty increases in chemical companies' sales but occasional profit shrinkages is the story of first-quarter '60 business.

For the chemicals and allied products industry as a whole, the U.S. Dept. of Commerce estimates that January and February sales were up 16% from the first two months of '59, and about 4% higher than in the last two months of the year.

Du Pont says its first-quarter sales volume was about 6% higher than in last year's initial period; this would be about 7% more than in fourth-quarter '59. First-quarter earnings, however, may be slightly less than in the January-March quarter of '59, "in view of price reductions on a substantial number of Du Pont products." President Crawford Greenewalt predicts that total sales this year will be at least equal to last year's $2.1 billion, "and perhaps a few percent higher."

Celanese Corp. reports a nearly 12% rise in first-quarter sales but a slight dip in earnings (*p. 38*); and General Aniline & Film calculates its first-period sales and earnings climbed 7% and 16%, respectively (*p. 38*).

Schering Corp., producer of ethical drugs, reports sales up 13% from the $19.8 million in first-quarter '59. Earnings were "slightly less" than last year's $2.7 million.

Petrochemical Pipeline

A preliminary plan for a $150-million pipeline and separation plant project that will transport liquid hydrocarbons—and possibly sulfur—from western Canada to the Chicago area is being considered this week by Pembina Pipeline Limited (Calgary, Alta.).

As outlined by Pembina President James Scott, the proposal would include:

- A 900-mile grid of 4- and 16-in. pipelines to wet-gas processing plants in Alberta's foothills area. These plants are expected to remove up to 92,000 bbls./day of propane, butanes and condensates, compared with present output of 14,000 bbls./day; and more than 3 million long tons/year of sulfur, instead of the current 200,000 l.t./year.
- An additional 1,300 miles of 16-in. pipe that would carry the products east and south through Saskatchewan, North Dakota, Minnesota and Wisconsin to some deep-water port on Lake Michigan.
- A $12-million hydrocarbon separation plant within 40 miles of Chicago.

Right now the whole plan is highly tentative. Steps to be taken before any construction can begin include lining up customers, arranging for financing, and obtaining both U.S. and Canadian governmental clearance.

And the sulfur scheme may not prove feasible. Pembina is considering several possible methods of transporting sulfur via pipeline: as a slurry of elemental sulfur in water, as hydrogen sulfide gas, as liquid sulfur dioxide, and as sulfuric acid. Research on these alternatives is being carried out at the University of Alberta and Colorado School of Mines Research Foundation laboratories.

Pembina disclosed its plan after Alberta Premier E. C. Manning had stated that a 15-fold increase in the province's sulfur production could be expected by '63. Much of Alberta's natural gas slated for export has a high sulfur content; and the provincial government's policy calls for removal of by-products prior to export of raw materials.

Pembina is aiming at a '61 start on construction, has formed Dakota-Eastern Pipe Line Ltd. as a subsidiary that might build the U.S. portion of the project.

No Dent in Deadlock

Though intensified efforts have been promised to settle the dispute over ownership of General Aniline & Film Corp., indications this week are that chances of such a settlement remain slim.

Outlook for breaking the deadlock was a principal topic at the annual stockholders' meeting, held last week at National Cash Register Co.'s auditorium in New York's Rockefeller Plaza, near GAF's new executive offices. Attendees heartily endorsed the desirability of getting this company—93% of whose stock was vested by the U.S. during World War II—back into private ownership.

And one small group—representing the U.S. citizens who own most of the other shares outstanding — expressed optimism that attorneys for both sides in the GAF lawsuit now have "the nuclei for a mutually satisfactory formula that will ring down the curtain on this 'cause celebre'."

Swiss Called 'Cooperative': But a comparison of the terms desired by the litigants for an out-of-court settlement makes such a compromise appear unlikely. Although Chairman David Green of the American Shareholders Committee reported that spokesmen for Interhandel—the Swiss holding company that has been suing to wrest GAF stock away from the U.S. government—"were most cooperative and desired a quick settlement," Interhandel still wants prompt and complete recovery of the vested shares.

On the other hand, Assistant Attorney General Dallas Townsend made it clear that the U.S. wants to sell the vested stock to the highest bidder, pay all tax and other proper claims, and then divide the net proceeds from the stock sale among the rightful persons.

Sales, Earnings Up: Townsend said he would guess that the Interhandel litigation — which has been shuttling back and forth in U.S. courts since '48—would "continue to be pending for a good many years." He observed that any case becomes more difficult to prove as time rolls on.

These were sad words for minority stockholders, who feel that GAF could make much more rapid headway if it were free of present limitations—such as the ban on issuing stock for new financing or acquisitions.

But partly offsetting that disappointment were the operating results reported by corporate President Philip Dinkins: in '59, sales mounted by 11.4%, to $159 million; and earnings rose by 22.7%, to $7.05 million. Research and development expenditures totaled $6.65 million—about 4% of sales. Additions to plant and equipment cost $5.9 million; but this year's capital budget is set at about $10 million. And in the first quarter of this year, sales increased approximately 7%, to an estimated $39.5 million; while earnings climbed by 16%, to $1.74 million.

At the meeting the company also elected two new members to the board of directors: Sidney D. Kirkpatrick, consulting editor of the Chemical Engineering series for the McGraw-Hill Book Co., who recently retired as editorial director of CHEMICAL WEEK and *Chemical Engineering* magazines, as well as vice-president of the McGraw-Hill Book Co. Second new member is Dallas S. Townsend, an Assistant Attorney General of the United States and Director of the Office of Alien Property in the Dept. of Justice at Washington, D. C.

Stress on Chemicals

At its annual shareholders' meeting in New York, Celanese Corp. re-emphasized that it's not to be called "a textile company," that the firm is now concentrating efforts in the direction of polymers and chemicals.

President Harold Blancke said that as a result of the company's long, close association with textiles, "it's become automatic in the minds of investors and security analysts that Celanese is classified as a textile company—with its lower price-to-earnings ratio." But, Blancke said, that classification is "out of date." Textile companies, he added, are Celanese's customers—not competitors.

And Robert Armstrong, vice-president and technical director, further stressed the company's interest by itemizing the allocations of his research budget: one-third on polymer science, aimed at developing new polymers; one-third on basic chemicals; one-third on developing new uses for existing polymers.

Sales in first-quarter '60, Blancke said, totaled $65.9 million, compared with $58.9 million in '59's first quarter; but first-quarter earnings in '60 will be down slightly from '59's 51 ¢/-share. He said, however, "It's not to be taken as a trend."

Additional plant facilities this year, he estimated, will cost $25 million. Other major developments expected in '60: commercial production of Arnel 60—a stronger triacetate fiber for lighter fabrics (*see also p. 71*); newer polymers that are now in various stages of development; and market and product development of the recently acquired (from Goodrich) Darvan (nitrile) fiber.

John Brooks, president of Celanese Fibers Co., pointed out a change in the end-use pattern for the company's fibers. In five years, he said, nonapparel fiber business had grown from 12% to 33% of total fiber sales.

Nod from Venezuela

Prospective private investors in Venezuela's projected chemical and petrochemical industry last week got a welcoming nod in the draft of a new government policy declaration. The declaration—likely to be made "official" with little change— marks off the general areas of investment opportunity likely to open up for private industry.

Currently, the government-sponsored projects (now being built) of the Venezuelan Petrochemical Institute include sulfuric acid, phosphoric and nitrogenous chemicals units. But the draft states that it is necessary to expand the complex (which has a refinery) to produce petrochemicals such as acetylene, ethylene, propylene, butylene, and synthetic rubber.

The institute, it says, is also studying plans to make chlorine-based insecticides and polyvinyl chloride plastics—which would help drain off the excess chlorine now being produced at the institute's complex at Moron—and explosives.

As the draft puts it, the government alone cannot handle all the investments necessary for full development of the country's petrochemical potential, or overseas marketing, and "it is convenient that new plants be established by private enterprise—either with or without government participation—whenever there is no real advantage in preferring the expansion of the petrochemical institute's installations."

COMPANIES

Kenrich Petrochemicals, Inc. (New York), manufacturer of aromatic petroleum resins, has filed with the Securities & Exchange Commission for registration of $175,000 of 7% convertible subordinated debentures due 1970, and 55,000 shares of Class A common for public sale. Of the net proceeds, $10,000 will be used to repay notes, $115,000 for new plant and equipment, including possible purchase of facilities in East Taunton, Mass. As a result of a recent recapitalization, outstanding shares were reduced from 495,450 to 247,725.

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Oil Shale Corp. (Beverly Hills, Calif.) plans to raise new capital to carry out further development of its process for production of shale oil. This company—headed by Huntington Hartford, grandson of the founder of the Great Atlantic & Pacific food store chain—proposes to offer 300,000 shares of new common stock to its present shareholders at $2.50/share. Application of proceeds: $200,000 to Denver Research Institute for continued experimentation, $50,000 for additional equipment, $40,000 for an engineering and economic report, $5,000 for a mining report, $70,000 for patent, accounting, legal and printing expenses.

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DuBois Chemicals (Cincinnati) has been organized to acquire the assets and business of Hall-Scott, Inc., DuBois Holding Co., and DuBois Co., Inc. The latter's principal business is manufacture and sale of cleaning compounds for industrial, commercial, institutional and transportation applications. The new company plans to issue 2,277,021 shares of common stock for the stock interests of the merging companies and an additional 200,000 shares for sale to the public.

EXPANSION

Paints: The Glidden Co. (Cleveland) will build a $2-million paint, lacquer and industrial products plant at Carrollton, near Dallas, Tex. The plant will be started within six months, will have an initial capacity of 200,000 gal./month. It also will serve as headquarters for Glidden's Southwestern region, but production will continue at the company's New Orleans, La., plant. The plant will eventually produce resin.

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Tires: Armstrong Rubber Co. (West Haven, Conn.) will set up a Western tire manufacturing plant. Site for the firm's first Western facility has not yet been selected but the venture will be financed by means of a $25-million, 20-year loan.

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Plastic Pipe Coatings: Tube-Kote, Inc. (Houston, Tex.), will build a $300,000 facility in Edmonton, Alta., to produce baked-on plastic pipe coatings for oil field equipment. Work will begin within three weeks.

Diammonium Phosphate: Virginia-Carolina Chemical Co. (Richmond, Va.) is constructing a $1-million diammonium phosphate plant in Polk County, Florida, adjacent to the company's big concentrated superphosphate facility at Nichols. Capacity will be about 100,000 tons/year; operation is scheduled for this fall. Due for June completion: a $10-million expansion of the superphosphate plant and construction of a new phosphate rock flotation plant at Clear Springs, Fla.

FOREIGN

Ammonia/England: Imperial Chemical Industries will spend $28 million to build a new ammonia plant and associated plants for urea and fertilizers at Severnside Works, southwestern England. This will be the second stage of development of an estimated $280-million venture at this site. Ammonia plant capacity: 100,000 tons/year. It's scheduled to go onstream with the associated plants in '63. Raw materials for ammonia manufacture will be based on light-oil fractions, source unstated. Also, ICI is expanding its methanol plant at Heysham Works (Lancashire). The new plant will add 45,000 tons/year to already existing capacity of 30,000 tons/year at a newly started Heysham plant.

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Superphosphates, Sulfuric Acid/Burma: Fertilizers and Chemicals, Ltd. (Haifa, Israel), will build during the next two years a $2-million superphosphates and sulfuric acid plant near Rangoon. Part of the equipment will be made in Israel. Government approval reportedly has been obtained.

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Fertilizers/Central America: Acajutla, El Salvador, has been selected, rather than a Costa Rican site, for a $10-million fertilizer plant, first stage of a complex to supply needs of the Central American "common market" republics (*CW, Dec. 19, p. 26*). Ammonia will be obtained from International Petroleum, subsidiary of Standard Oil (New Jersey).

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Aluminum/Russia: Two newly discovered shallow deposits in central Kazakhstan (U.S.S.R) reportedly containing "hundreds of millions of tons of nepheline-kyanite" may result in expansion of the Kazakhstan aluminum industry. Also, output from the Institute for Mining and Metallurgy's new hydrochemical process to turn nepheline ore into alumina is increasing to the point where it may be feasible to stop purchasing bauxite from north Caucasus.

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Films/India: The Indian government has awarded a contract to the French firm Bauchet for a $9-million plant at Ootacamund to produce cinematographic, photographic and X-ray films. Bauchet will supply equipment and technical know-how for the project. Its bid reportedly was 40% under that of East German Agfa.

PROBLEM: You are dealer at seven-handed draw poker. Nothing wild. Jacks or better to open. The player at your left opens for the same amount as the ante. Three players fold, and the other two call. Do you call, raise, or fold?

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ANSWER

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Washington
Newsletter

CHEMICAL WEEK
April 23, 1960

Revamping of $700 million worth of defense contracts for next year will mean losses for some chemical companies, increased sales for others.

Atlas ICBM production will be upped almost 15% by the new schedule. North American Aviation's Rocketdyne Division makes the engines. Production facilities for the Minuteman ICBM will be expanded. Thiokol, Aerojet-General and Hercules are the propulsion system contractors.

The Polaris program will be accelerated. But as plans shape up now, the increase means construction of six more submarine nuclear reactors rather than a big boost in output of the missiles, which will come later. Aerojet-General builds the Polaris rocket engine.

The Air Force wanted an extra $16 million for research on superrocket boosters, but was turned down. The money would have been earmarked for work on fabrication of nozzles out of ablative materials, such as used in missile nose cones, and toward other techniques for reducing rocket costs.

To offset these increased programs, the Pentagon cut back drastically on three projects: the Bomarc-B antibomber missile (Marquardt is the major propulsion contractor); the Sage antibomber electronic control system; and construction of two nuclear-powered attack submarines.

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Authorized imports of residual fuel oil have been increased through June. This will ease some tight supply situations and soften prices for at least a few months.

The Interior Dept. has agreed to let importing oil companies bring an additional 12 million bbls. of the fuel into the eastern half of the U.S. from April 1 through June 30. The increase came over the strong protests of the coal industry, which wants to keep down such imports. The hike—from 425,000 bbls./day, to almost 491,000—was sought by major importers who said their supplies were running short. Coal spokesmen accused the oil companies of deliberately dumping the fuel at discount prices to cause shortages.

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Atomic Energy Commission will try to attract young engineers by using a special training program designed to give them basic knowledge in the atomic field. AEC is finding it difficult to hire top graduates at the $4,940 it can pay, and certainly can't hire experienced nuclear engineers at that salary.

The new program, starting in July, will give 18 months' training, divided between classroom and lab at Oak Ridge or Argonne, and 9 months' on-the-job training at reactor construction projects. Starting salary for

graduates will be upped to $5,880, which AEC feels is competitive with private industry.

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Reorganization of the Public Health Service to put more emphasis on problems of environmental health, including radiation, is in the works at the Dept. of Health, Education & Welfare. The revamping would mean more money, more research, and would give separate identity to a function of PHS that has been growing like Topsy.

The administrators want a separate bureau under the Public Health Service, perhaps called the Bureau of Environmental Health. The new agency would take over such functions as water pollution, air pollution, and radiological health. In addition it would pull in some of the research activities now handled through the National Institute of Health in the environmental field.

Such a shake-up will require legislative action. But the House Appropriations Subcommittee, headed by Rep. John Fogarty (D., R.I.), has long urged such a reshuffling. Early this year 10 top department officials headed by Dr. James Hundley, associate director of NIH, were pulled off their regular duties to work out the reorganization.

One effect of the move will undoubtedly be to increase research, both that done by the department and that farmed out to private laboratories and universities. Opening of new radiation laboratories at Montgomery, Ala., and Las Vegas within the past year has already expanded research facilities. Most of the work is now being carried on there and at the Taft Sanitary Engineering Center in Cincinnati.

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The drug industry is launching a study of drug costs to consumers as a counterattack to the Kefauver investigation. Doctors, drug firms and consumer groups will be asked to help put together statistics showing who uses what kind of drugs, how they pay for them, and whether anyone is deprived of needed drugs for financial reasons. No target date has been set for completion of the study.

Senate investigators set out to debunk the industry's claims on research. The former medical director of Squibb Laboratories, Dr. A. Dale Console, charged that more than half the research in this country is aimed at innovation and planned obsolescence for profit rather than real medical advancement. He and several other doctors attacked the industry's promotion methods as "wasteful ballyhoo."

Republicans are increasingly fearful that the investigation is providing the psychological climate for a bill to provide medical care for the aged. Ranking GOP member Everett Dirksen says he will try to slow down the hearings by objecting to the committee having meetings while the Senate is in session. He scored Senator Kefauver for unfair indictment of an entire industry.

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U.S.-East Europe Trade—Threat or Opportunity?

Threats	Opportunities
● Communists' use of foreign trade for political and economic warfare	● Increased employment here as a result of increased exports
● Dumping of products on world markets	● Development of alternative markets for friendly nations
● State trading organizations outbuying and outselling private firms	● Chance to obtain gold, manganese, chrome ore, other needed resources
● Use of national revenue for foreign-trade subsidies	● Increased exchange of goods and services for mutual benefit
● Unfavorable impact of East-West trade on third countries	● Better international relations with friendly eastern European nations.
● Use of aid-with-trade programs	

More Red-Bloc Trade: a Mixed Blessing

A combination of U.S. government pressures for more exports, increasing foreign competition and the steadily spreading Communist economic offensive is forcing American firms to explore new avenues of foreign sales. Last week, a group of U.S. industrialists, businessmen and economists met in Chicago to ponder the prospect of trade with eastern Europe.

Formal papers, discussions and corridor talk indicated widespread belief that east Europe wants and needs trade with the West, that the West can benefit from increased trade with the Communist bloc, if ample safeguards are provided.

According to Henry Ludmer, conference director and professor of management at Roosevelt University (sponsor of the conference), improved bilateral trade agreements with east European countries are possible and desirable. Multilateral agreements, on the other hand, are hard to get, harder to enforce, said Ludmer, who also offered the check list above. "If we could get bilateral agreements, it would be important for us to have the terms of trade, items to be traded, financing and credit terms spelled out clearly and in great detail, and proper arbitration machinery set up to prevent any misuses of East-West trade," he added.

Insignificant Trade: U.S.-east Europe trade at present is insignificant, although it has been increasing steadily since the end of the Stalin era of self-sufficiency. Since World War II, there have been three distinct phases of U.S.-Communist trade:

(1) In '48, total U.S. exports to the Communist bloc amounted to $396.6 million. Imports from that area were $233.5 million. These figures represent the high-water mark of U.S.-Communist trade, by dollar value, of the past 12 years.

(2) After '48, U.S. trade with the bloc fell sharply as the "cold war" became hotter. In '53, total U.S. exports to the bloc fell to a low of $1.1 million, imports from the area reached a low of $46.1 million.

(3) Since '53, however, our trade with the Communist bloc has risen as "cold war" tensions eased. In '58, the U.S. exported $112.6 million worth of goods to east Europe, imported $68.3 million worth. Still, this amounted to only two-fifths of 1% of all U.S. imports in that period. Exclusive of Russia, the leading Communist countries trading with the U.S. are Poland, Hungary and Czechoslovakia.

"It is apparent," said Herbert Slutsky, assistant professor of economic geography at Roosevelt, "that the trade between the U.S. and east Europe, exclusive of European Russia, is negligible and in no way signifies a present market or future competition."

Russia itself is not a significant trading partner of the U.S., ranking second to Poland in U.S. trade. In '58, U.S.S.R. exported $17.5 million worth of goods to the U.S., imported $3.4 million worth. Major items of U.S. export were steel sheets ($1.5 million), chemicals ($480,000) and cattle hides ($260,000). Leading Russian export to the U.S. was $5.8 million worth of benzene. Clearly there is almost no primary trade in manufactured goods—exports or imports—between the U.S.

and the eastern European nations.

Conferees seemed to agree, however, that east Europe is sincere in its interest in increasing trade with the West. In time of war, undoubtedly, the bloc would be self-sufficient, but aside from war, the bloc needs outside trade to get the most out of its productive capacity and resources, and to benefit from outside technology —a needed stimulant for the Communist economies.

Political Tool: Biggest drawback to trade with the Communists is political. The Communists claim in their propaganda that trade has a higher mission, that it's an activity in support of a peace policy, a channel for relaxation of world tensions. East European governments see trade as another means of promoting Communist cooperation, and possibly a weapon of economic warfare. Consequently, 75% of Soviet-bloc trade is internal.

But despite these conditions, which are applied to most, but not all, east European foreign trade, Slutsky said, the region has rediscovered the value of trade with the West. The Soviet Union, for example, recognizes its stake in trade outside its sphere of influence. And, east Europe does have a significant export capacity. To industrial nations, the region can sell petroleum, coal, manganese and chrome. To machinery importers, east Europe can ship machine tools, metallurgical equipment, oil-field machinery, power-generating equipment and transportation equipment. And there is ample fertilizer for export to agricultural areas.

Most likely, goods traded with east Europe move from buyer to seller over the complex river system serving the region. Five major rivers—Elbe, Oder, Obe, Vistula and Danube—and a supporting network of inland waterways and canals are the main transportation arteries for the 1,000-mile-long, 650-mile-wide region commonly labeled eastern Europe. The region covers 2 million sq. miles (excluding East Germany and European Russia), stretches from the Baltic Sea in the north to Greece in the south and from the Adriatic Sea in the east to the Black Sea in the west. The rail network serving the nine political divisions (East Germany, Poland, Czechoslovakia, Hungary, Rumania, Albania Bulgaria, Yugoslavia, and East Russia to the Ural mountains) is good, but their roadways, generally, are not.

Legal Complications: Any thought of increased trade with eastern Europe forces consideration of the many legal complications involved. These are so great they make it questionable whether the rewards of such trade are worth the effort involved.

That the market looks worthwhile to many firms is made clear by the mounting number of export-license applications. Also, Communist nations appear anxious to obtain American goods and technology. But, if East-West commerce is to grow significantly, its present legal context must be modified.

Michael Weissman, associate, of the international law firm of Baker, McKenzie & Hightower, gave the conference three proposals that might ease the legal complications. He admitted, however, that legal obstacles are a reflection of differing trade systems in the two areas.

No proposal "can wholly alleviate the inevitable frictions that manifest themselves when a state-trading nation does business with a nation whose economy is organized on a free-market basis," he said.

Weissman's most extreme proposal calls for formation of a U.S.-owned and -operated trading corporation to conduct trade with the Soviet bloc. This is not an "admirable solution," he warned.

A second proposal calls for the U.S. government to enter into a series of bilateral trade agreements with east European countries. These would authorize the exchange of particular goods in specified quantities over a given period of time. Under the present system of U.S. export licensing, such bilateral agreements would virtually obligate the U.S. government to agree in advance to issue licenses within the limits of the trade agreement. Otherwise, U.S. firms would be reluctant to bid for orders under the agreements.

The third proposal, and the one most acceptable to Weissman, simply advocates high-level negotiations to explore means of "mitigating obstacles to trade with eastern Europe." This proposal, said Weissman, "minimizes governmental intervention with trade relations, reserves to the proper parties—American businessmen—relevant decisions as to the acquisition of raw materials and disposition of finished goods, makes relaxation of trade controls contingent upon an improvement in the political relations between East and West."

Weissman predicted that the volume of trade between the U.S. and east Europe "is certain to grow." Also, he said the growth will bring new pressures for relaxation of controls and amendment of existing legislation. No matter how great the pressures, he warned, these legal barriers must be altered only after careful analysis.

Future Trade: "Can we then," Slutsky asked, "from these facts and figures come to some rationale regarding the present and future state of our exports, imports and invisible trade (tourist travel, aid) with east Europe?

"Yes, I believe we can. Presently our trade with east Europe is small. As their production climbs, there is the possibility that more of their goods will become available as exports to the U.S. There is the probability that the countries of this region will present competition . . . and a relaxation of East-West tensions may not only present a challenge in the form of competition, but also open a vast new market for American goods. A population of more than 20 million people could certainly offer a new and rewarding market."

Aluminum Launching

Aluminum marketers soon will cash in on one of their prime sales targets —commercial-shipping vessels. Reynolds Metals Co. tells of plans to build two aluminum barges for hauling chemicals on the U.S. inland waterways (CW Market Newsletter, April 16).

The barges — first all-aluminum commercial vessels ever built in the U.S. — will be ready for use next September. For chemical shippers, the new, lightweight craft will open new opportunities to ship moderate-size bulk-liquid cargoes (200 to 600 tons) by water in corrosion-resistant barges.

Under its new plan, Reynolds (Richmond, Va.) will build two aluminum barges for operation by National Marine Service (New York), one of the nation's largest barge contract carriers, under a long-term lease.

Both barges will utilize double-skin construction (two thicknesses of metal) for maximum safety, and will be

Still in near-perfect shape, these cedar panels were taken from a house (shown below) which was painted 3½ years ago with a PVAc emulsion paint. Location: Blackburn Rd., Summit, N. J. When oil paint was used, house had to be painted every 3 years.

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compartmentalized to handle smaller shipments. The larger barge will have a maximum cargo capacity of 1,600 short tons—nearly 12,500 gal. of light commodities such as gasoline, somewhat lower volumes of denser products.

The four cargo tanks of the larger model will hold 200, 300, 500 and 600 short tons of material, respectively. Over-all barge dimensions: length, 130 ft.; beam, 50 ft.; over-all height, 12 ft.; draft, 8.6 ft.

Shippers Gain: Chemical shippers will get two benefits from using the new barges, says National Marine's vice-president for sales, Paul Ellis: (1) they will be able to ship products in volumes as low as 200 short tons by water—Ellis admits that this kind of barge service is uncommon now; (2) shippers will be able to ship liquid commodities with minimum risk of contaminating them with corrosion from steel cargo tank walls.

National Marine figures this protection should make aluminum barges valuable for carrying products that cannot tolerate trace impurities.

Caustic, because of its reaction with aluminum, is one of several chemicals the barges will not handle.

Lower Costs: Besides these sales points that National Marine will use, the company feels the new craft will help cut operating costs, improve service.

The barges will accommodate about 15% more cargo tonnage than steel barges of the same size. And Ellis tells CHEMICAL WEEK that his firm expects to clean the new vessels much more rapidly than it cleans present steel models, thus hopes to slash costly tie-up of river equipment.

Despite the advantages of aluminum tanks, National Marine will not charge premium rates on cargoes that don't require this added protection. However, Ellis says, his company will ask higher tabs for commodities that now move by other means of transportation in aluminum containers.

Aluminum in Ships: Aluminum marketing men see the Reynolds-National Marine agreement as a major breakthrough of aluminum into the ship construction field. The larger barge will have the biggest aluminum hull structure ever made. And other all-aluminum ships are now on the drawing boards, will be under construction later this year.

New air-truck link permits 'through' shipping on one bill of lading.

New Boost for Chemical Air Freight

American Airlines' newly launched air-truck service is regarded by CPI transportation executives as another step along the road to "through" air-freight service. But, despite certain features of American's new service, it's not likely to make a significant dent in the chemical shipping business, except for a limited number of high-value, small-volume items such as drugs.

Major advantage of "through" air service is that shippers can have their goods picked up at the plant, trucked to an airfreight terminal, flown to the port nearest the customer and trucked to final destination.

The new service, called Truckair, links 575 medium-size communities with more than 60 cities in American's airfreight network. It will permit manufacturers to use airfreight to ship directly—on one bill of lading—from plant to customer in a continuous through-freight movement. The new setup is the result of contracts made between American and a number of major trucking firms.

Other advantages of the service: reduced paperwork resulting from a single bill of lading, and a cheaper single-rate tariff rather than a combination of truck and air rates. For example, says American, the per-100-lb. Truckair rate between Anderson, Ind., and Los Angeles is $1.91 cheaper than a combination of the separate truck and air rates.

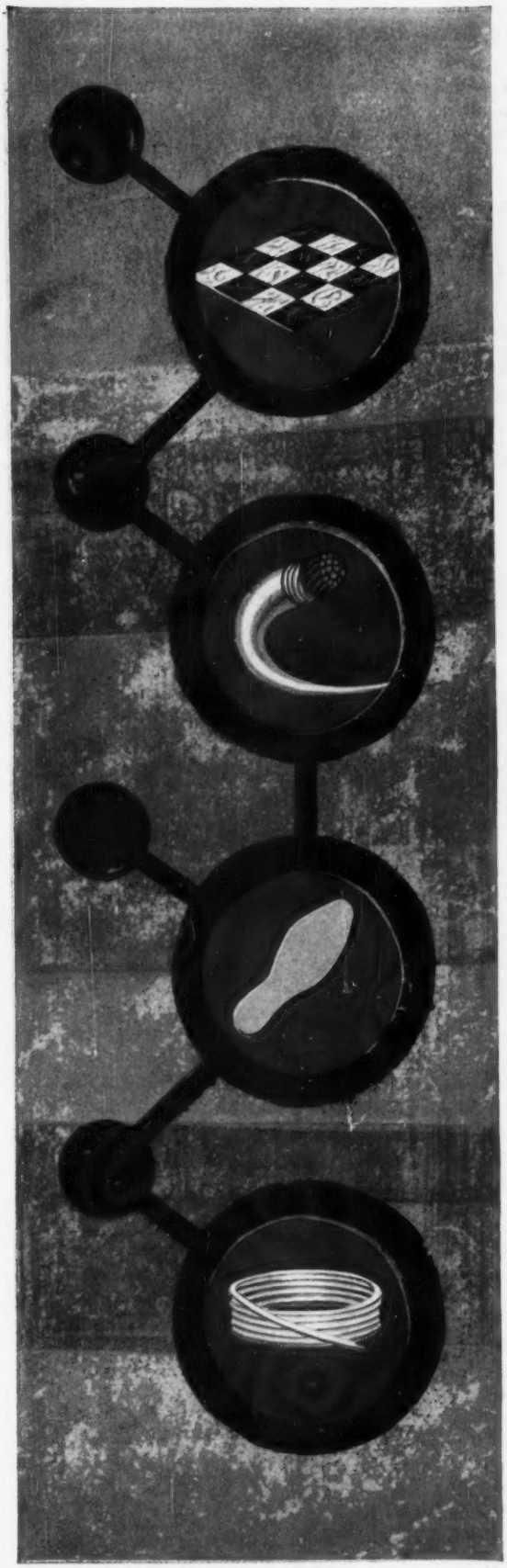
Others, Too: Airfreight service has been available in various forms for about three years, is offered by other carriers such as Northwest Airlines, Flying Tiger Airlines, Emery Airfreight.

Emery's service offers greater flexibility, according to Emery's Sales Vice-President John Emery, Jr. "Since we are not tied to any particular trucker in a given area, we can select the one that provides the best schedule, moves the goods fastest. We can use a combination of surface carriers to move a given shipment," he said.

As for rates, Emery claims it can offer the same combination-rate savings, also provide one bill of lading, and be responsible for the shipment from pickup to delivery.

CPI Target: Shippers, particularly in the CPI, have long sought through-freight service that would allow them to ship via several modes of transportation, using one bill of lading and a single through-freight rate. Such service would be particularly desirable for shipments using a combination of rail and truck, or rail and barge services. Of course, piggybacking, fishybacking and, in some instances, birdiebacking (transporting truck trailers on railroad cars, barges and in aircraft) are gaining popularity; but in these forms of transportation, the cargo remains in the trailer throughout the entire haul.

In the next few years, drugs, medicines, toilet preparations and other



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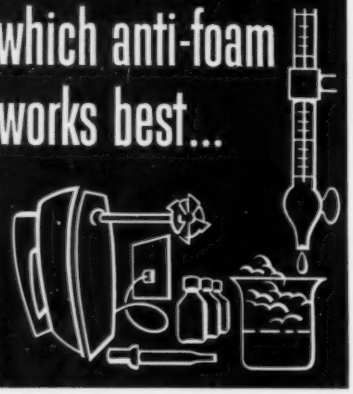

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SALES

small bulk items seem destined to be the principal cargoes of airfreight service. But as Frank Tighe, Union Carbide Corp.'s senior traffic manager puts it, "That's not to say that airfreight won't catch on for chemicals. Some sort of spark is needed, and maybe through-rates and new aircraft will provide that spark."

DATA DIGEST

- **Peroxide:** New 63-page booklet outlines properties, uses, methods of storage and dilution of hydrogen peroxide. Solvay Process Division, Allied Chemical Corp. (New York).
- **Insulating Materials:** 12-page bulletin presents property and use data on company's line of electrical insulating materials. Listing includes: varnishes, paints, adhesives, compounds, thinners, irradiated materials, wire enamels, permafils, mica materials and coated materials. Insulating Materials Dept., General Electric Co. (Rotterdam, N.Y.).
- **Silica Aerogel:** Technical bulletin discusses chemical, physical and structural properties of a silica aerogel used for thermal insulation. Monsanto Chemical Co. (St. Louis, Mo.).
- **Synthetic Rubber:** Brochure details the properties, methods of processing and test results of a new "natural synthetic" rubber, *cis*-4 polybutadiene (*CW Technology Newsletter, March 26, p. 83*). Rubber Chemicals Division, Phillips Chemical Co. (318 Water St. Akron 8, O.).
- **Resins:** New price list provides price/quantity information for various forms of resins, including rubber resins and coumarone-indene polymers. Also described: plasticizing oils and resins and rubber reclaiming agents. Pennsylvania Industrial Chemical Corp. (Clairton, Pa.).
- **Pyrethrum Insecticides:** Folder describes insecticides based on pyrethrins (extract of pyrethrum flowers). Hurd Associates (1120 Park Ave., New York).
- **Laminate:** Single-sheet technical bulletin describes new hot-punch copper-clad laminate. Includes physical, mechanical and electrical properties, and dimensional data on thickness of the copper foil and on overall sheet size, as well as information on bond strength, hot solder and oven testing for heat resistance, and insulation resistance tests. Taylor Fibre Co.

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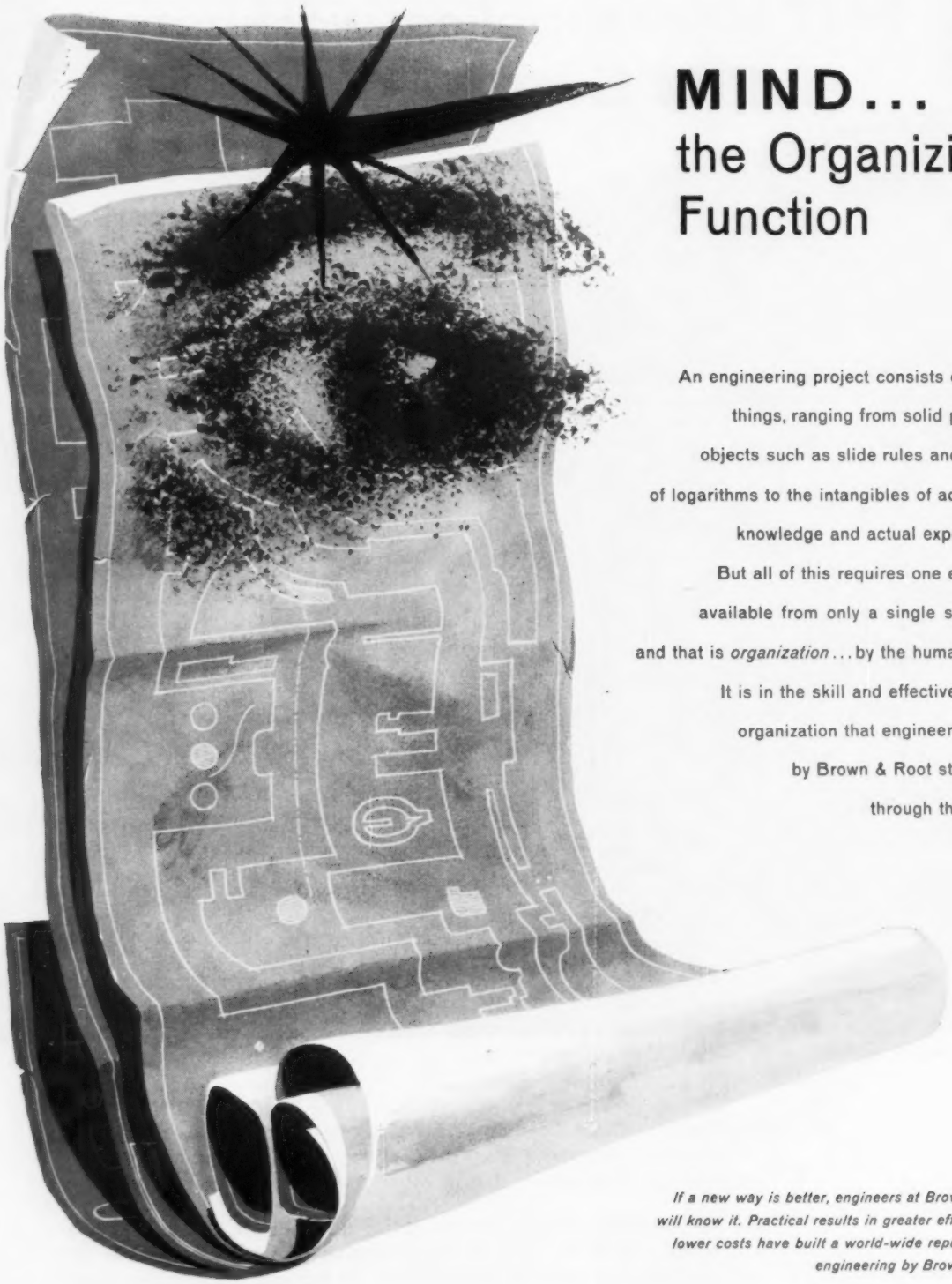

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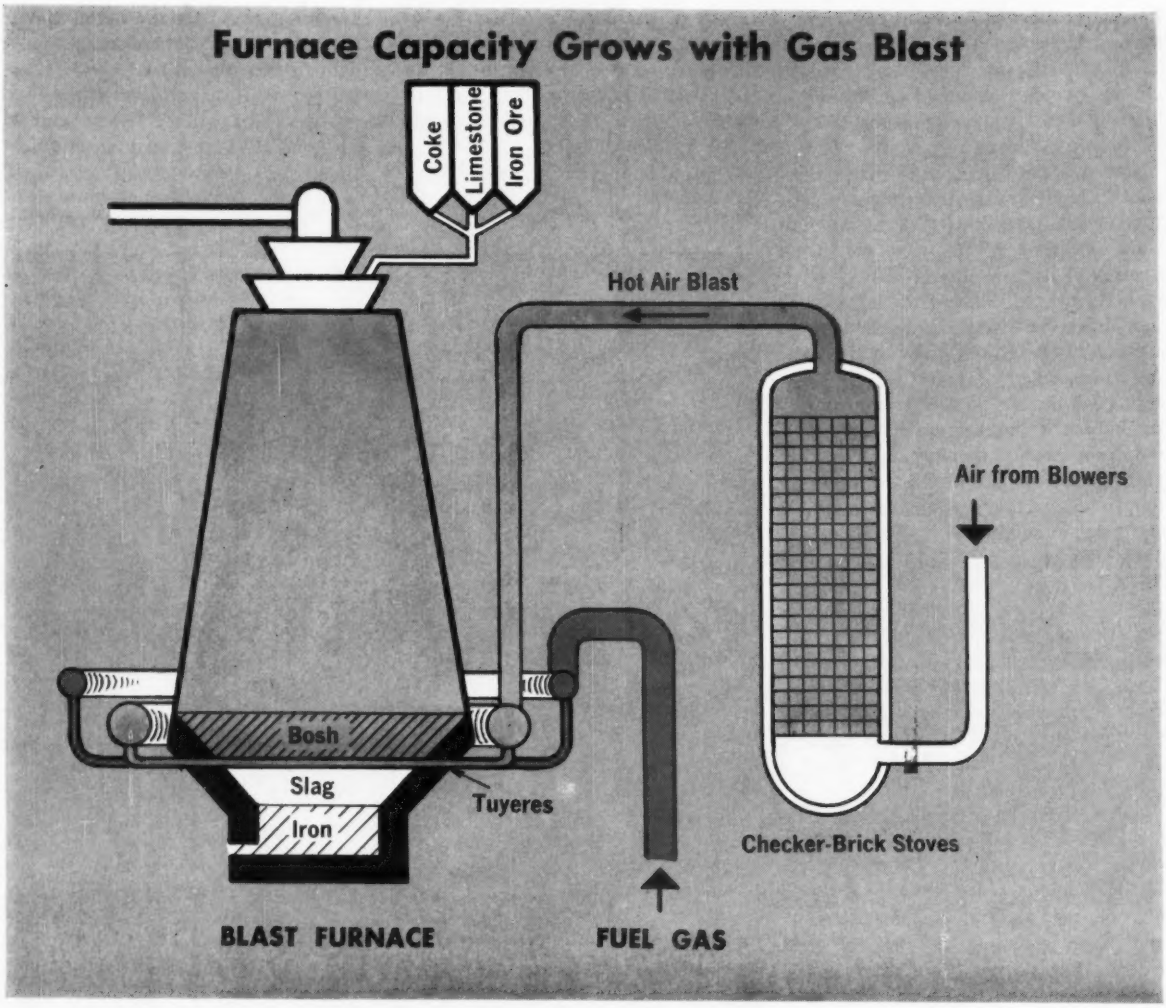

Fuel Gas Reshapes Coke Chemicals Outlook

Last week it was disclosed (CW Technology Newsletter, April 16) that one of Pittsburgh Coke & Chemical Co.'s Neville Island (Pittsburgh) blast furnaces is using 4% raw coke-oven gas in its air blast. Operating in this manner, the furnace has boosted iron output 12%, cut coke consumption (and concomitant by-product output) by 15%.

With its successful use of coke-oven gas as a blast-furnace reducing medium, PC&C has made a breakthrough, capping a series of improvements in blast-furnace technology. The net effect is to revise the supply-and-demand structure of raw materials and by-products that characterizes blast-furnace operations.

Moreover, C. T. Marshall, vice-president of PC&C's Coke and Iron Division, explains that his is not the only company studying the use of reducing gas in blast furnaces; others are planning to use natural gas.

If this trend is confirmed, the nation's blast furnaces may ultimately consume some 12-14 million tons/-year of natural gas — over 6% of the total production, while coke consumption (and output of coke-oven by-product chemicals) will be reduced, even as blast-furnace capacity expands.

The Trends Behind It: Key to the use of coke-oven, natural or fuel gas as reducing agents in a blast furnace is the temperature of the air blast. In the conventional blast furnace about 3.5 tons of air are consumed for each ton of iron produced. This air, preheated in regenerative checker-brick stoves, burns the coke to carbon monoxide, a reducing gas. Thus, while the gas reduces the iron ore, heat is provided to melt the iron.

Coke consumption falls in proportion as the temperature of the air blast goes up. And for this reason furnace operators have always tried to keep air blasts as hot as possi-

ble. In the past, maximum temperature was limited to about 900 F by the refractories in the checker-brick stoves. However, these stoves have been gradually improved, and modern installations can maintain the air blast at a temperature of about 1600 F.

But this development gave rise to another difficulty: as the air entering the furnace reaches 1600 F, it burns coke immediately in front of the tuyeres to carbon dioxide instead of carbon monoxide. Result: the iron just above the tuyeres is not reduced. Instead it becomes sticky and, as the furnacemen say, it "hangs"; it forms a white-hot dome that suspends the burden up inside the stack. When the dome breaks, the furnace "slips" and tons of ore are puffed out of its top, to be scattered over the surrounding neighborhood.

On the other hand, if fuel gas is mixed with the hot air as it enters the furnace, the fuel gas reduces the iron ore in front of the tuyeres, keeps the furnace from hanging even when the blast temperature exceeds 1600 F. PC&C finds that 4% is the optimum percentage. Less does not reduce the ore sufficiently; more consumes too much oxygen from the air, thus prevents formation of carbon monoxide from coke higher up in the stack.

The blast furnace depends on coke high in the stack to support, heat, and begin reducing the ore as it enters. If more gas were used and mechanical means other than the coke were used to support the ore, the blast furnace would become similar to the direct reduction processes such as the H-Iron (*CW, Feb. 27, p. 66*) and the HyL sponge iron process (*CW, Sept. 27, '58, p. 61*).

At PC&C the raw coke-oven gas is sent to the blast furnaces after the tars, ammonia, and light oils have been removed. It is injected into the air blast at each of the 12 tuyeres, which pierce the hearth from all sides (*see drawing, p. 53*). The gas is part of excess fuel produced in the plant and thus does not have to be replaced.

Marshall explains that PC&C is a merchant iron manufacturer, producing pig iron for sale only; and since it has an advantageous geographic location where it can get cheap iron ore and coal, the economics of its process can hardly be considered typical. It is reasonable, however, to allow $16/ton of coke, 25¢/1,000 cu. ft. of gas, $11.90/ton of iron to cover fixed charges on a blast furnace. The new operation spends an additional $1.60/ton of iron for gas, while it saves $1.90 on coke and $1.80 in fixed charges.

This comes to a net savings of $2.10/ton of iron produced, or about 5% when iron costs $40/ton. This savings is not startling, but it is important enough to encourage most blast-furnace operators to use reducing gas in their air blast. When they do, the effect will be felt by natural gas producers and coal-tar chemical consumers alike.

Double Dissolver Tames 'Hot' Atoms

Workmen shown here are installing an atomic fuel-element dissolver at the Hanford plant near Richmond, Wash. (*see p. 74 for news of other activity at Hanford*). This new dissolver, first of its kind, will be used to put solid-fuel elements into solution. Spent reactor fuel elements are dissolved in strong acids prior to chemical processing. Capacity is normally limited by the concentration of active uranium-235 going into solution; released neutrons, traveling in a straight line, can sustain fission, and the solution becomes dangerous. Key to the new dissolver is a double wall. Fuel elements are hung between the walls in a metal crib. Thus the inside wall, which is built of 6-in.-thick concrete, prevents neutrons from flying across the tank to bombard fuel elements on the opposite side.

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Mobile Atomic Power

New strides in mobile atomic power plants were taken in recent weeks: Aerojet-General Nucleonics started a 2,200-kilowatt reactor for the AEC at Idaho Falls, Ida.; Union Carbide's 500-kw. reactor went critical at Oak Ridge, Tenn.

The 2,200-kw. reactor is tied in with development work on a mobile power plant for the Army. It uses nitrogen gas in a closed circuit to cool the reactor core. When the project is completed, the reactor will be combined with a gas turbine-driven power conversion system being developed by the Corps of Engineers.

In this combined unit, hot nitrogen leaving the reactor core will pass through the turbine to generate about 400 kw. of electricity. The entire power plant will be transportable in four packages weighing less than 38 tons, and is designed so that it can be dismantled and reassembled within 36 hours after a shutdown.

The 500-kw. unit is part of a development project for a nuclear-powered aircraft engine. Called Tower Shielding Reactor II, it's a standard "swimming pool" reactor to be used in studying radiation passing through air and various shielding materials.

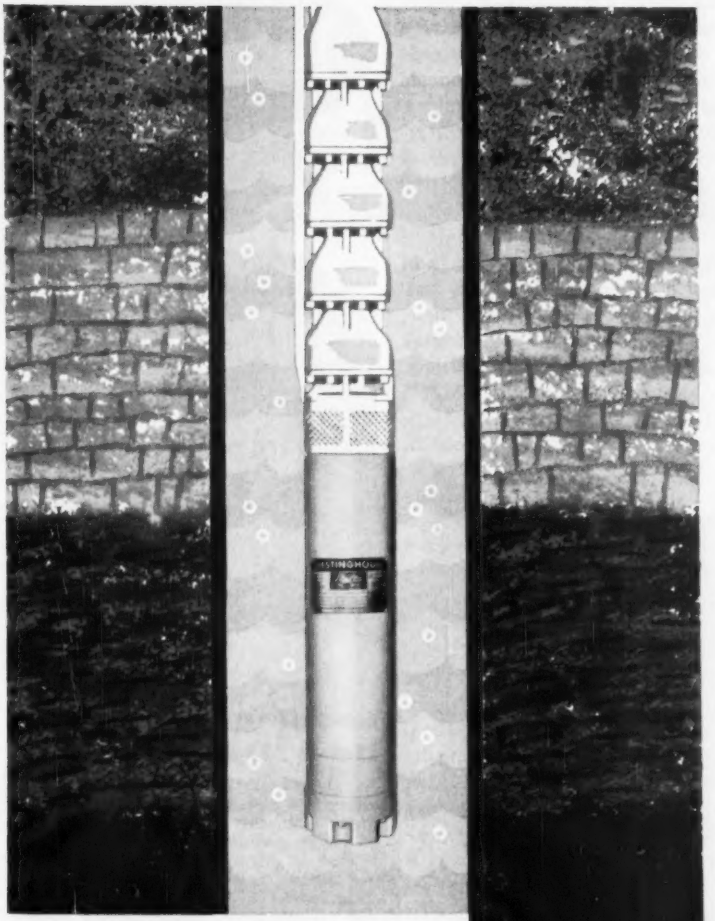
In some studies, the reactor must be suspended 200 ft. in the air. Control is by six boron carbide-loaded shells, which move in and out from the center of the reactor. The shells are designed to move together so that the neutron flux will be the same in all directions.

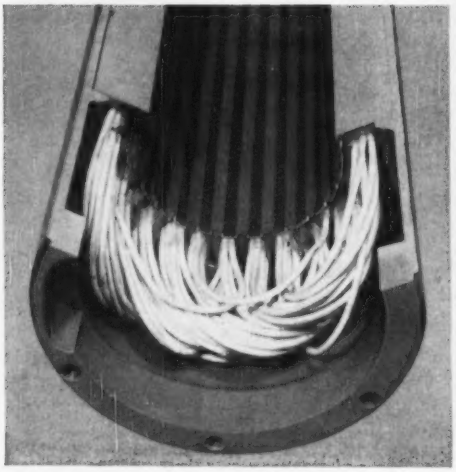
Extruded Reactor Fuel

Allis-Chalmers Co. has been commissioned by AEC to produce ceramic nuclear fuel by extrusion. Reason for the extrusion process: economy. It will replace the normal pressing method of making nonmetallic solid nuclear fuels; pellets are identical except for length. Finished pellets are put into metal fuel-element tubes (usually about 8 in. in diameter by 5 ft. long) to protect them from the coolant circulated in the reactor. They're easy to handle; radiation, though intense enough for detection, is not dangerous. This is not the case with spent fuels, whose fission-product radioactivity presents serious hazards.

Another new development using

B.F.Goodrich Chemical *raw materials*





Submersible pump motors are manufactured by Westinghouse Electric Corporation, Sunnyvale, California, using waterproof wire insulation made of Geon by Sequoia Wire & Cable Company, Redwood City, California. B. F. Goodrich Chemical Company supplies the Geon vinyl.

Problem of motor submersion solved with Geon insulation

This new motor operates under water using the water itself as a lubricant. Since the housing is water filled and "breathes" well water, its operation depends on the insulation of Geon.

Geon met tough requirements. The manufacturer says that many materials were tested to find one that would stay waterproof indefinitely and also have enough mechanical strength to stand up under the winding process and under flexing imposed in starting.

A test motor was submerged under 400 feet of head for six months and subjected to frequent starting and operation. At the end of the test, the Geon insulation showed no signs of deterioration. Geon also eliminates need for thick and dense coatings over end turns—eliminating a cause of trapped heat and premature failure.

Here's another example of the way that Geon vinyls open new markets, or improve present applications. For more information, write Dept. GH-8, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

A TRADE MARK OF B.F.GOODRICH CHEMICAL COMPANY

Geon VINYLS

A DIVISION OF THE B.F.GOODRICH COMPANY

B.F.Goodrich Chemical Company
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B.F.Goodrich GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

Many difficult jobs made easier by patented Cowles impeller

The high speed, high shear principle employed in the Cowles Dissolver creates zones of intense turbulence within the material by direct mechanical action. The material is forced rapidly outward through itself, causing violent impact and shearing of particle against particle. This action, coupled with the ability of the exclusive power transmission system to deliver full power even at slow speeds results in great versatility and rapid ultimate dispersion of a wide variety of materials. Here are just a few examples—

☐ **Ester gum adhesives,** 40% solids, processed at 500 gallons per hour. High quality, stable end products.

☐ **Printing inks,** many types, processed in a fraction of the time of ordinary mixers. Self cleaning impeller speeds color and batch changeovers.

☐ **Stable asphalt suspensions** dispersed to fineness of 99% through 325 mesh screen in a single pass.

☐ High viscosity *mastic compounds* produced in spectacular quantities as compared to "Z" blade mixers—also *grease, pipe* and *joint compounds.*

☐ Many ordinary types of *paints* can be processed completely on the Cowles, without milling.

☐ Full range of *paper coatings—clays, latex rubbers, polyvinyls,* high grade *coating colors* etc., processed in fraction of time required by ordinary mixers.

☐ **Fruit juice concentrates**—Cowles saves hundreds of man hours for manufacturers in fresh fruit dispersing operations. Improves end products, too.

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MOREHOUSE COWLES

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Please send me information on Cowles Dissolvers for processing the following materials.

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Name ..... Title.....

Firm .....

Address .....

City..... Zone..... State.....

ENGINEERING PROCESSES

Arc Machining: U.S. Army research has discovered a novel way of machining hard-to-cut metals. Key: low-voltage, high-frequency electrical arcs. The piece to be machined is mounted as the anode in the cutting machine; the cutting tool, preshaped as the reflected image of the finished piece, is mounted as the cathode. Electrical particles traveling between the cutting tool and the anode tend to form the rough shape in the inverse image of the tool. The process has been evaluated in terms of machining time, finish, and loss of electrode material, and is claimed to be highly efficient. It is described under PB 161267, Office of Technical Services, U.S. Dept. of Commerce, Washington 25.

•

Cold Pipelines: The Cryogenic Engineering Laboratory of the National Bureau of Standards has developed a mathematical model that simulates transfer of liquefied gases (e.g., hydrogen, oxygen, nitrogen, and helium) through long pipelines. The model is said to reveal that transfer by pipeline is more economical than by the insulated Dewar-type shipping containers currently used. The difficulty in calculating cryogenic pipelines stems from (1) the low temperatures required and (2) expansion and vaporization due to heat gain. The model is based on laws of conservation of energy, momentum, and mass; it must be adapted to economic conditions with empirical data. It is described under circular 596, Superintendent of Documents, U.S. Government Printing Office, Washington 25.

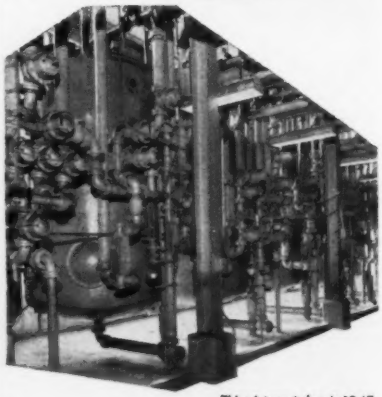
•

Phthalic Acids from Coal: Bergbau-Forschungs GmbH (Essen-Kray), a research institute for German coal producers, is piloting a new route to terephthalic acid from toluene. Process: continuous chloromethylation within short reaction times, followed by oxidation of the chloromethyl compound by nitric acid. Equipment for this process is claimed to be the same as that required to produce dimethylphthalic acid from xylene. Both xylene and toluene are recovered from coke-oven gases. Details of the phthalic acid processes will be unveiled this week at the annual meeting of the German Chemical Society in Stuttgart.

PATHWAYS OF A PIONEER

ILLCO-WAY DESIGNERS AND BUILDERS

MODERN EQUIPMENT FOR ionXchange



This picture, taken in 1947, shows a fully-automatic IonXchanger designed and built by IWT.

Leading the Way in De-I Developments

At the time the IonXchanger shown above was installed, Illinois Water Treatment Company already had a decade of design and manufacturing experience behind it. Many other firms, now selling in the field, then had yet to cut their teeth on their first small jobs.

Ash from Corn Syrup

This particular job was especially important because it pioneered successfully in one of the many process fields — other than the purification of water — where de-ionization was proving practical. The equipment is still operating at full effectiveness today in the big sugar refinery where it serves most economically to remove ash from corn syrup.

It is significant that IWT had this early experience in the design of automatic equipment, and so was ready for the widespread trend toward "automation" in many industries in recent years.

THIS EXPERIENCE CAN MEAN A LOT TO YOU

If you are considering the use of ion-exchange for the purification or concentration of chemical products, or if you need purified water for high-pressure boiler make-up or process use, be sure to take advantage of IWT pioneering experience and specialized knowledge.
Call your IWT representative.

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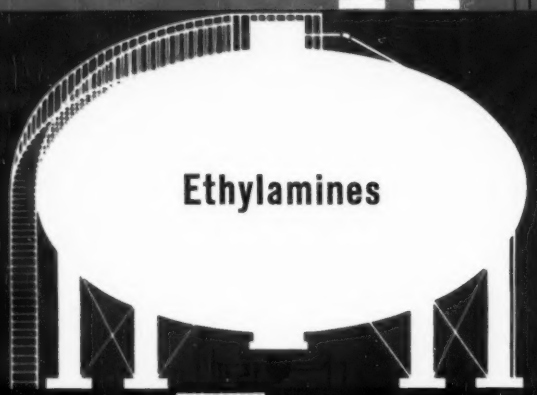
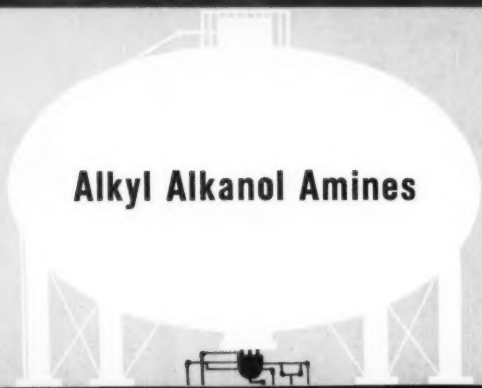
840 CEDAR ST., ROCKFORD, ILLINOIS
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.



PENNSALT

AMINES

The largest family of C_1 to C_5 alkyl amines and derivatives available from a single source



PENNSALT CHEMICALS CORPORATION
Three Penn Center, Philadelphia 2, Pa.

Pennsalt Chemicals
ESTABLISHED 1850

PENNSALT ALKYL AND ALKYL ALKANOL AMINES

PRODUCT	
AMINES—COMMERCIALLY AVAILABLE*	
MONOMETHYLAMINE (anhydrous)[a]	CH_3NH_2
DIMETHYLAMINE (anhydrous)[b]	$(CH_3)_2NH$
TRIMETHYLAMINE (anhydrous)[c]	$(CH_3)_3N$
MONOETHYLAMINE (anhydrous)	$CH_3CH_2NH_2$
MONOETHYLAMINE (70%)	$CH_3CH_2NH_2$
DIETHYLAMINE	$(CH_3CH_2)_2NH$
TRIETHYLAMINE	$(CH_3CH_2)_3N$
MONO-n-PROPYLAMINE	$CH_3CH_2CH_2NH_2$
DI-n-PROPYLAMINE	$(CH_3CH_2CH_2)_2NH$
TRI-n-PROPYLAMINE	$(CH_3CH_2CH_2)_3N$
MONOISOPROPYLAMINE (anhydrous)[d]	$(CH_3)_2CHNH_2$
DIISOPROPYLAMINE	$[(CH_3)_2CH]_2NH$
MONO-n-BUTYLAMINE	$CH_3CH_2CH_2CH_2NH_2$
DI-n-BUTYLAMINE	$(CH_3CH_2CH_2CH_2)_2NH$
TRI-n-BUTYLAMINE	$(CH_3CH_2CH_2CH_2)_3N$
MONOISOBUTYLAMINE	$(CH_3)_2CHCH_2NH_2$
MONOAMYLAMINE	$C_5H_{11}NH_2$
DIAMYLAMINE	$(C_5H_{11})_2NH$
TRIAMYLAMINE	$(C_5H_{11})_3N$
AMINES—SEMI-COMMERCIAL (In Pilot Plant Quantities)*	
SEC-BUTYLAMINE	$CH_3CH_2CH(NH_2)CH_3$
1,3-DIMETHYLBUTYLAMINE	$(CH_3)_2CH_2CH_2CH(CH_3)NH_2$
BIS(1,3-DIMETHYLBUTYL)AMINE	$[(CH_3)_2CH_2CH_2CH(CH_3)]_2NH$
DIISOBUTYLAMINE	$[(CH_3)_2CHCH_2]_2NH$
ALKYL ALKANOL AMINES—COMMERCIALLY AVAILABLE*	
DIMETHYLAMINOETHANOL	$(CH_3)_2NC_2H_4OH$
ETHYLAMINOETHANOL	$C_2H_5NHC_2H_4OH$
DIETHYLAMINOETHANOL	$(C_2H_5)_2NC_2H_4OH$
ETHYLAMINOETHANOLS (mixed)	$C_2H_5NHC_2H_4OH/C_2H_5N(C_2H_4OH)_2$ approx. 50/50 by weight
DIISOPROPYLAMINOETHANOL	$[(CH_3)_2CH]_2NC_2H_4OH$
ISOPROPYLAMINOETHANOLS (mixed)	$(CH_3)_2CHNHC_2H_4OH/[(CH_3)_2CH]_2N(C_2H_4OH)_2$ approx. 60/40 by weight
DIBUTYLAMINOETHANOL	$(C_4H_9)_2NC_2H_4OH$
ALKYL ALKANOL AMINES—SEMI-COMMERCIAL (In Pilot Plant Quantities)*	
1-DIMETHYLAMINO-2-PROPANOL	$(CH_3)_2NCH_2CHOHCH_3$
ETHYLDIETHANOLAMINE	$C_2H_5N(C_2H_4OH)_2$
BUTYLAMINOETHANOL	$C_4H_9NHC_2H_4OH$
BUTYLDIETHANOLAMINE	$C_4H_9N(C_2H_4OH)_2$
1-CYCLOHEXYLAMINO-2-PROPANOL	$CH_2(CH_2)_4CHNHCH_2CHOHCH_3$

(a) also available as 40% aqueous solution
(b) also available as 25% and 40% aqueous solutions
(c) also available as 25% aqueous solution
(d) also available as 50% aqueous solution

PROPERTIES

SHIPPING INFORMATION

MOLECULAR WEIGHT (CALC'D)	SP. GR. @ 20/20°C.	DISTILLATION, °C. @ 760 mm Hg.	AVG. WT. PER GAL., LB.	FLASH POINT, °F. (open cup)	FORM AS SHIPPED
31.06	0.67	–6.3(b.p.)	5.6	0	Liq. Comp. Gas
45.08	0.66	6.9(b.p.)	5.5	0	" " "
59.11	0.64	2.9(b.p.)	5.3	0	" " "
45.08	0.70-0.71	16.6(b.p.)	5.9	0	" " "
45.08(anhyd.)	0.79-0.81	36(b.p.)	6.6	0	Liquid
73.14	0.70-0.71	53.5-59.5	5.9	0	"
101.19	0.73	85.0-91.0	6.1	20	"
59.11	0.71-0.72	45.0-52.0	6.0	–35	"
101.19	0.74	105.0-112.0	6.2	45	"
143.27	0.76	150.0-158.0	6.3	105	"
59.11	0.68-0.70	30.5-34.5 (95%)	5.8	–35	"
101.19	0.715-0.720	84(b.p.)	5.9	30	"
73.14	0.74	74.5-81.0	6.2	10	"
129.24	0.76	153.0-165.0	6.3	135	"
185.34	0.77-0.78	199-216 (95%)	6.5	175	"
73.14	0.72-0.74	64.0-75.0	6.3	20	"
87.16	0.75	87.0-110.0	6.3	40	"
157.29	0.77	185.0-205.0	6.4	150	"
227.22	0.78-0.79	235.0-265.0	6.6	190	"
73.14	0.72-0.73	61.0-70.0	6.0	20	Liquid
102.20	0.747-0.753	105.0-111.0	6.2	55	"
187.36	0.772-0.778	179.0-205.0	6.5	160	"
129.24	0.74	131.0-143.0	6.2	85	"
89.14	0.885-0.890	130.0-137.0	7.4	105	Liquid
89.14	0.91-0.92	160-170	7.5	160	"
117.19	0.88-0.89	157.5-164.0	7.4	135	"
109.0-119.0 (combining wt.)	0.95-0.99	100-265	8.1	90	"
145.24	0.873	188.0-192.0	7.3	150	"
114.5-117.5 (combining wt.)	0.91-0.94	110-265	7.8	155	"
173.29	0.852-0.868	222.0-234.0	7.2	200	"
103.16	0.845-0.855	121.0-127.0 (95%)	7.1	95	Liquid
133.19	1.01-1.02	246.0-260.0	8.5	255	"
117.19	0.88-0.99	192.0-210.0	7.4	170	"
161.24	0.96-0.97	268.0-286.0	8.1	260	"
157.25	—	freezing point 43°C.	—	—	Solid

*Commercial products are available in tank cars, tank trucks, 55 gal. drums and 5 gal. cans. Semi-commercial products are available in limited quantity and can be made available in larger quantities on reasonable notice. We may also be able to supply other alkyl amines and derivatives not shown here. Write us for further information.

How you can profit from . . .

Pennsalt's complete service on amines

in product and process planning

If your program includes products that contain organic nitrogen with alkyl groups, alkoxy groups, or combinations of these, you may be able to use amines

profitably. Applying over a quarter-century of experience with these versatile chemicals, Pennsalt can give you expert recommendations on possible reactions and perhaps assist you in determining the most economical synthesis route to your end product. When you design pilot equipment, you will profit from the complete physical and chemical data available from Pennsalt.

in selecting amines for economy

Pennsalt manufactures a broad line of C_1 to C_8 alkyl and alkyl alkanol amines . . . methyls, ethyls, propyls, butyls, amyls and a number of ethylene oxide derivatives. You can count on unbiased help in determining which is the *one* amine most economical for your application.

in purchasing

Your Pennsalt representative is skilled in analyzing use requirements and can help you set up a purchasing schedule that will assure prompt, uninterruped deliveries. He will help determine the most convenient and economical package size and strength and show you how to save on combination shipments in tank cars, tank trucks and drum lots.

in handling and storing

Pennsalt's Technical Service Engineers will recommend safe, practical handling and storage methods, help design bulk storage facilities and process equipment, advise you on materials of construction, piping, pumps, valves and other equipment for amine service.

Pennsalt manufactures dithiocarbamates and other amine derivatives and can often supply special amino compounds to meet specific process requirements. To get the benefits of these Pennsalt services see your Pennsalt representative or write Industrial Chemicals Division, PENNSALT CHEMICALS CORPORATION, Three Penn Center, Philadelphia 2, Pa.

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Insurance safety specialists Anderson (left) and Sluyter appraise chemical plant procedures.

'Forgotten Men' Among Casualty Cost Cutters

Ernie Anderson and Aaron Sluyter (pictured here), chemical engineers with insurance broker Johnson & Higgins, are looking for work. Their job: to help chemical companies cut casualty insurance rates—in some cases to as low as 85% below the average for plants with the same type of processes. And, although their services are free, Anderson and Sluyter contend that they are too often overlooked by plant management.

Their problem of being "overlooked" is one shared with engineers of several other large brokers* and most large insurance companies. "Some chemical companies don't know that insurance industry specialists are available to help them solve their problems with materials, men and equipment. And many companies don't know how to properly tap the specialized talent even when they are aware of it," says Sluyter.

For example, some companies pay consultants to run noise surveys in their plants. Their insurance companies will run these surveys without charge, Sluyter says. Among other areas of expert service available: industrial hygiene, toxicology, ventilation engineering—virtually any aspect that has to do with safety.

Anderson points out that specialized plant aid services go beyond safety angles. For example, some insurance companies offer courses in work simplification and other phases of supervisory and employee training. Moreover, specialists in these areas are prepared to visit almost any plant. But because most are stationed at the insurance company's home office, and their services must be specifically requested, many manufacturers fail to make use of them. This is particularly true if a company deals with a local insurance agent; it may not even be aware of all the services the home office of the company could provide.

Depressing the Rate: The objective of all users of these services is to depress their own, and the industry's, casualty insurance rates. About half of a company's casualty rate is determined by the industry average, the rest depends on the individual company's performance. "So all a company has to do is set a better record than the industry average and it'll get a better rate," says Anderson.

But getting a better rate isn't as easy as it sounds. For one thing, casualty rates are more sensitive than property insurance rates. For example, a processing building rebuilt to original design specifications after a fire may well draw the original's property insurance rate. But if someone was

* Marsh & McLennan Inc. and Johnson & Higgins are among the largest. Brokers tout one advantage to customers: they are insurance experts who represent the client rather than the insurance companies.

Anderson: 'A better record than average gets a better rate.'

Sluyter: 'Often, specialized insurance talent isn't tapped.'

hurt in the fire, the casualty insurance rate would certainly rise.

Unless there is a serious injury, however, and a big rate jump, plant management may not even know how the injury directly hiked its costs. Partly, this is because rates are set on a corporate basis; changes can be hard to pinpoint. But Sluyter says there has been a trend in the chemical industry toward showing individual plant performance in the corporate prorating of insurance costs. This makes it easier for a plant manager to see exactly how his plant's performance affects the corporate rate, gives him greater incentive to improve performance, Sluyter says.

Outsider's Viewpoints: Aside from making companies more aware of the sensitivity of rates, consultants such as Sluyter and Anderson can bring a broader awareness of hazard control. "We visit over 100 plants yearly. This means over 100 different views of hazard control," says Anderson.

Such a broad view is particularly helpful to the small plant. Compared with the ratio at large plants, the lost-time/man-hours ratio is five times greater in the small industrial chemicals plant, and one-and-a-half times greater in the small consumer-chemicals (drugs, soap, paint) plant.

And, the usefulness of outsiders' help is one reason why many large companies don't favor self-insurance. When a company is self-insured, it has very little chance to have the safety of its procedures compared with practices elsewhere. And that's where the insurance industry's safety engineers, like Anderson and Sluyter, come in.

"One in a hundred lost-time reports is a death. In five years, only one of a hundred supervisors may learn that it can happen in his crew. But there are many different circumstances that might have produced such an accident. He has only learned about one of them," says Anderson.

Classification Survey: One of the most important rate-cutting visits from an insurance specialist can be a classification survey to determine whether plant risks have been properly assigned. Fire studies are often made, but casualty studies are sometimes overlooked.

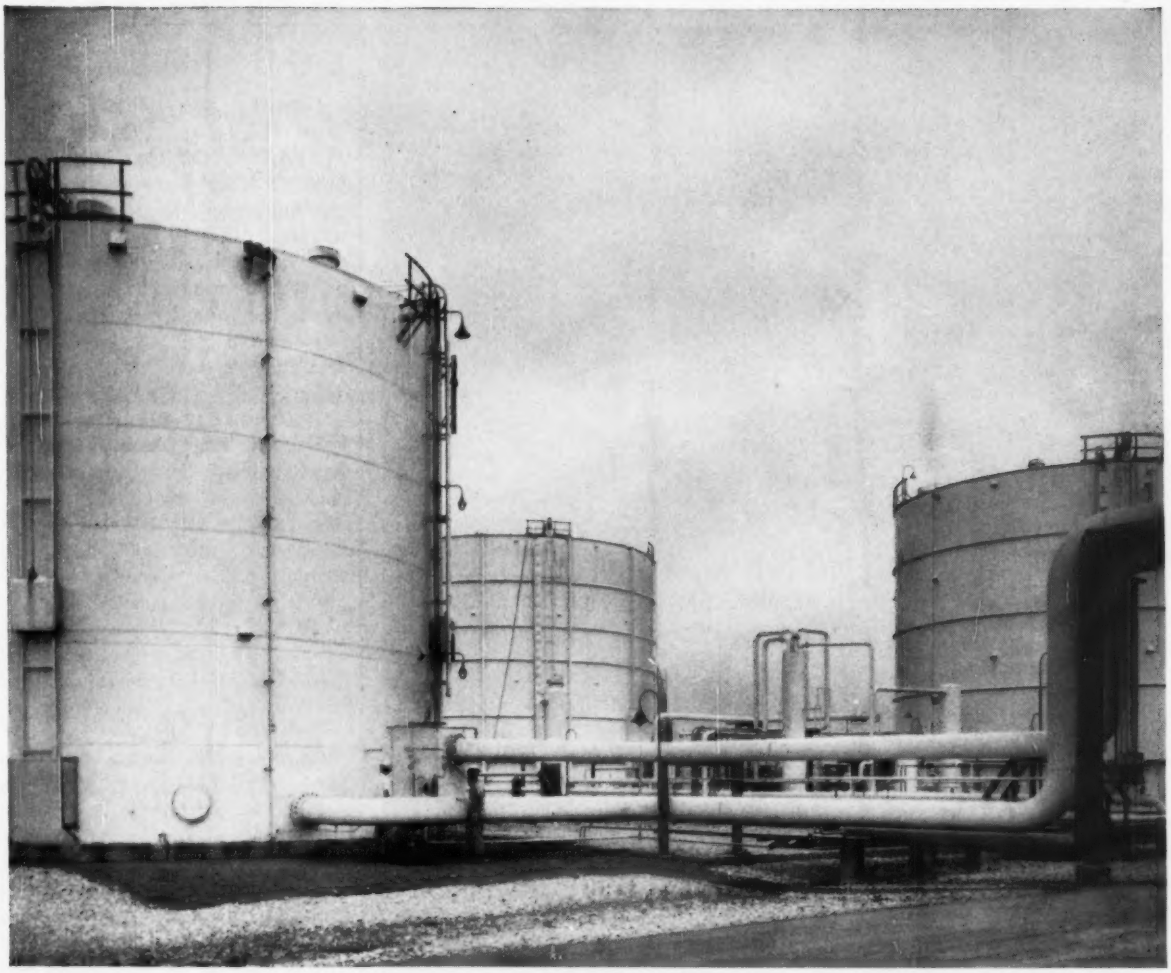
The casualty studies are usually based on The Chemical and Dyestuff Rating Plan. Because the chemical industry is more complex than most others, the plan sets up about 70 different risk categories rather than one or two, as is done for most industries.

Under the plan, which has been adopted by most states, each type of operation (e.g., nitration, sulfonation, chlorination) carries a different basic rate. And, the rate for a particular operation will vary, according to industry performance, from state to state. Thus, even though two plants make the same product with equally good safety performance ratings, they may draw different casualty insurance rates.

A classification study may show that one particularly hazardous operation is penalizing other operations in the same plant area. If it can be isolated, the plant's over-all rate might be lowered.

"We're not trying to backstop every move a plant engineering department makes. But whenever a plant makes a major process change or addition, or runs into a troublesome problem that might result in a plant hazard, the insurance specialist can often offer advice that will save the company money and time," says Sluyter.

But it is up to the plant to call the specialist in. And, although casualty insurance is written on a corporate basis, the quickest route to a rate reduction is in the hands of the plant manager.



"8 years of continuous, trouble-free service, and we expect our WIGGINS Gasholders to last indefinitely,"

says Vincent C. Henrich, Plant Manager, Rohm & Haas, Deer Park, Texas

Simplicity, safety, continuous usability–these advantages have added up to eight years of continuous operation and dollar savings with General American WIGGINS Gasholders for Rohm & Haas at their Deer Park, Texas plant.

The six gasholders in the Deer Park installation, storing acetylene, range in capacity from 20,000 to 250,000 cubic feet. Since they went into use in 1951 these gasholders have never required shutdown for maintenance or repairs.

"Heart of our storage system," says Mr. Henrich, "is the gas-tight, impermeable WIGGINS Dry Seal. Because it needs no servicing, it eliminates downtime for repairs, and thus increases our production. We inspect our WIGGINS Gasholders only once a year."

The WIGGINS Dry Seal requires no operating accessories, no water, tar, or grease, is resistant to chemical action and weathering, and is unaffected by abnormally low or high temperatures.

For complete data, write or call the nearest General American office. You'll find *it pays to plan with General American.*

Plate and Welding Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

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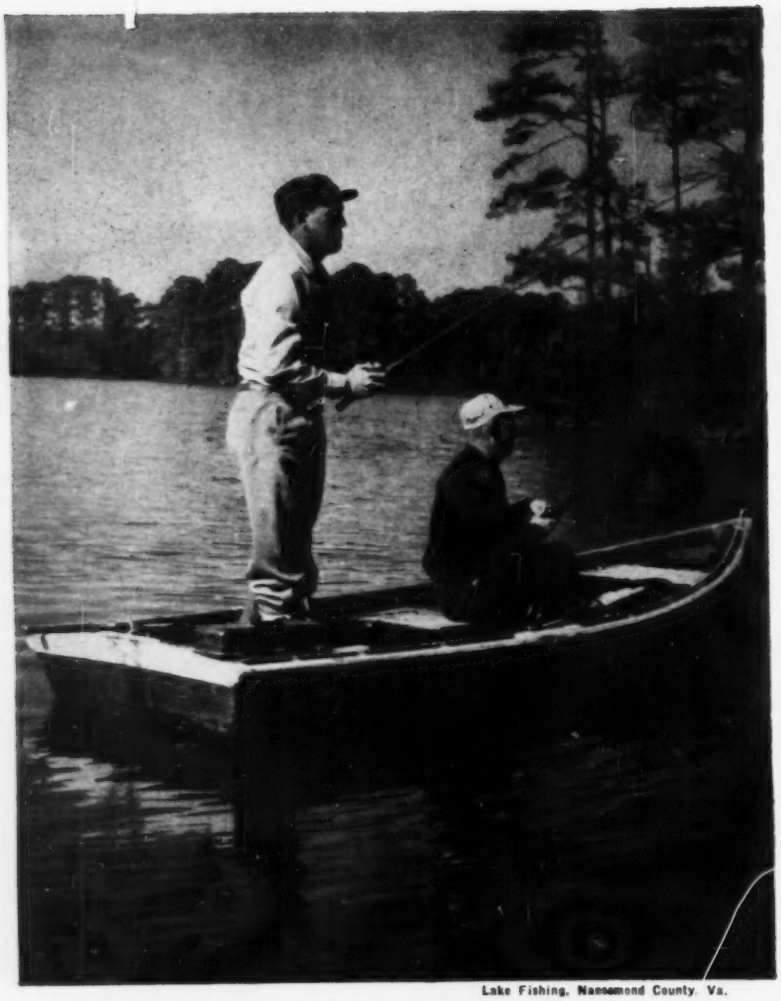

Lake Fishing, Nansemond County, Va.

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Officially representing the cities and towns of Boykins, Branchville, Franklin, Norfolk, Portsmouth, Smithfield, South Norfolk, Suffolk, Virginia Beach, Wakefield and Windsor; the counties of Accomack, Isle of Wight, Nansemond, Norfolk, Northampton, Princess Anne and Southampton.

PRODUCTION EQUIPMENT

Canned Sump Pump: Fostoria Corp. (1200 North Main St., Dept. 13, Fostoria, O.) says its new submersible sump pump is the first to combine pump and motor in a single leakproof unit. A nonclogging pressure switch provides fully automatic on-off operation, without the use of floats. The pump is recommended for service from 700 gph. at 4-ft. head to 200 gph. at 10-ft. head. Cost: $49.95.

•

Magnetic Trap: Cesco (4025 Sebastopol Highway, Santa Rosa, Calif.) is marketing an improved magnetic trap for removing tramp iron from low-pressure liquid and slurry lines. A quick-release clamp, which replaces screw attachments, holds the unit's base plate in place, simplifies cleaning. The trap is made of bronze or stainless steel. Line size diameters range from 1½ to 3 in.

•

Pipe Insulation: Union Asbestos & Rubber Co.'s Fibrous Products Division (1111 West Perry St., Bloomington, Ill.) has a new wrap-on asbestos insulation, called Insutape, that's flameproof, weatherproof and can be removed and reapplied without losing insulating efficiency. Insutape is made of long-fibered asbestos rovings enclosed in a tubular, woven asbestos jacket. The jacket's neoprene covering resists abrasion and penetration of moisture, oil and grease.

•

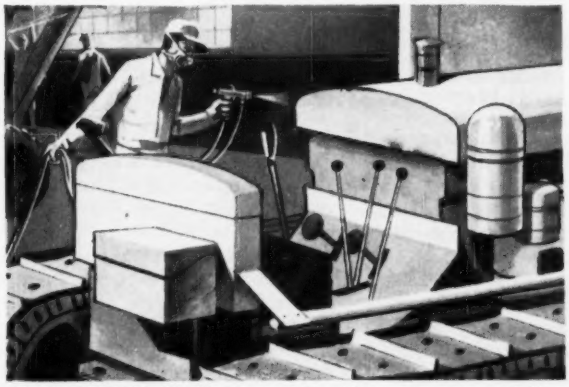
Indicator Lamp: Sylvania Lighting Products Division of Sylvania Electric Products Inc. (730 Third Ave., New York 17) says its new, low-cost electronic indicator lamp for computers, scanning devices, panel-switch pushbutton lights has a rated life of 3,000 to 5,000 hours—10 times that of competitive lamps. Sizes: 4 to 28 volts, with red, green, yellow and white color caps that can be snapped over or cemented to the lamp.

•

Gas-Cylinder Safety: A safety enclosure developed by Allied Chemical's General Chemical Division for cylinders of fluorine, other corrosive, explosive and poisonous gases is a new offering of Apex Scientific Co. (59 Donna Maria Way, Orinda, Calif.). Controls on the steel-housing exterior provide for metering the gas and purging the system with nitrogen.

ALKYD MELAMINE BAKING ENAMEL—BENTONE 27 gellant provides uniform film thickness in dipping and baking.

EPOXY RESIN COATINGS—BENTONE 27 gellant boosts control over runoff, film thickness and flow during cure.



VINYL FINISHES—BENTONE 27 gellant steps up weather resistance, color uniformity, spraying properties.

POLYESTER GLASS-REINFORCED STRUCTURALS—BENTONE 27 gellant provides thixotropic viscosity control.

No problems in high polarity paints and compounds with **BENTONE® 27**, National Lead gellant

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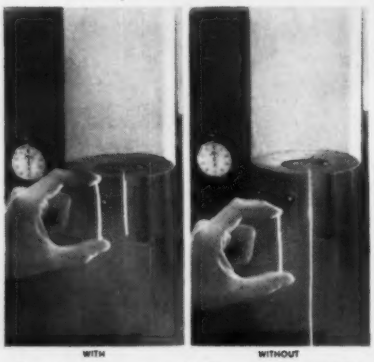
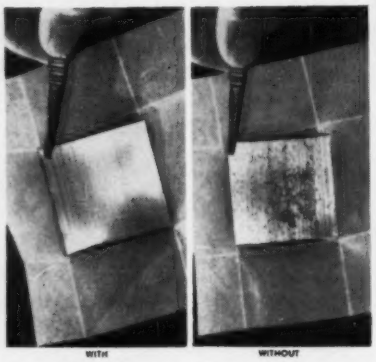


Santonox and Santonox R

ANTIOXIDANTS PROTECT POLYOLEFINS FROM HEAT DEGRADATION

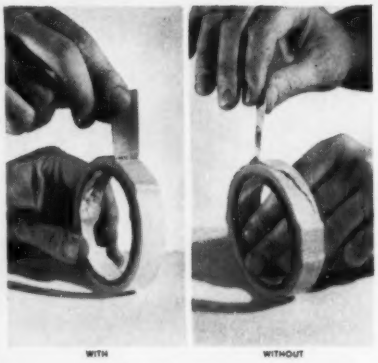
In Melt Index Test (above), samples milled 5 minutes and 30 minutes show how SANTONOX stabilizes polyethylene for more consistent performance. SANTONOX antioxidants stabilize low-, medium- and high-density polyethylene against degradation by processing heat and during product aging. They guard electrical compounds, film, molded products, cable covering, and extruded pipe made of rubber, polyethylene, polyisobutylene and other olefins. Most basic producers of polyethylene now add 0.02—0.05% to their finished compounds. Polyethylene users frequently mill in an additional 0.05% to give even more heat and aging protection to their finished products. In addition to SANTONOX and SANTONOX R, other Monsanto antioxidants show great promise for stabilizing a variety of polyolefin resins. To evaluate them, write Monsanto your requirements and the type of resin.



Sodium Benzoate

KEEPS METAL PRODUCTS BRIGHT AND RUST-FREE

Makers of water-base paints and aqueous aerosols incorporate a few tenths percent of sodium benzoate to inhibit rusting of the containers. Toolmakers go a step further: some dip their steel products in a 5% solution of sodium benzoate, thus putting a noncorroding anodic layer on the metal surface. Other wrap small tools in paper containing sodium benzoate. Either the simple dip or the paper wrap keeps the metal free of rusting. Many plants that operate calenders or large metal rolls mop a 5% solution of sodium benzoate over the equipment when shutting down; this keeps steel rolls, packaging machinery, or conveyor rolls free of corrosion during down time. And when cutting oils can't be used in machining materials like rigid plastics or hard rubber, sodium benzoate solutions frequently do the job, and with no rusting of valuable power equipment.



Santovar A

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Aroclor 5460

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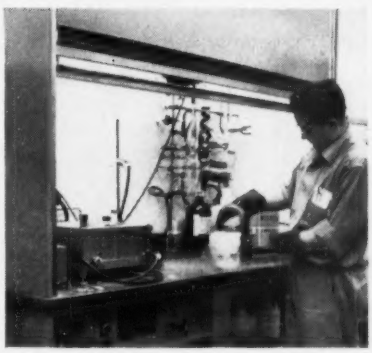

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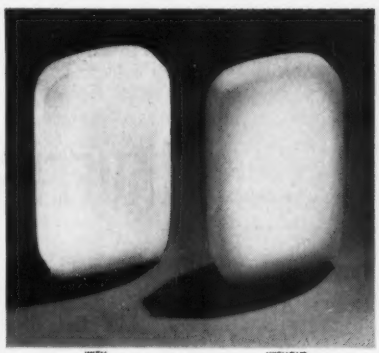
It reacts with phthalic anhydride and propylene glycol to give finished polyesters as chemically resistant as much higher cost epoxies! HBP-A polyester resin/fiber glass laminates retain their strength in boiling 10% caustic, an extreme condition that dissolves ordinary polyesters away from the glass reinforcement. For binder resin applications, HBP-A can be formulated to make solid, uncross-linked resins with very high softening points. Substitution of HBP-A in no way affects normal cooking procedures; processing time is not increased; the finished resins possess higher heat distortion temperatures and better light and heat stability. Try the new formulation with HBP-A when you are cooking polyester resins for use in reinforced plastic pipe, storage tanks, fume hoods, duct work or other products exposed to corrosive atmospheres.



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Airco's Wells grooms polyvinyl alcohol fiber for tire-cord role.

New Fiber for Tire Fray?

Four fibers awaiting large-scale production in the U.S. presage what may be a coming revolution in the types of fibers commercially available. They include two polyvinyl alcohol fibers, a new form of cellulose triacetate, and a new modified cellulosic—all designed, in keeping with the trend, to fit specialized end-uses.

Behind the expected deluge of new fibers (mostly modifications of familiar fiber materials) is the growing maturity of research not only in spotting opportunities for specialized fibers but also in working out fiber modifications in the lab. In tire cord, for example, once-dominant cotton was displaced by rayon, which in turn is feeling the competition of both nylon-66 and nylon-6.

Now, Vinal FO, a nonacetylated polyvinyl alcohol fiber featuring high strength, low deformation, and good adhesion to compounding materials is bidding for tire-cord duties. Under development by Air Reduction Chemical Co., a division of Air Reduction Co., Inc. (New York), Vinal FO is one of two PVA fibers Airco is expected to make, probably at Calvert City, Ky., site of the firm's new PVA resin plant. (However, the final decision on when or where the fibers will be made still hasn't been reached, according to Airco.)

Vinal FO is made by a semimelt process, with solvent used to reduce the melting temperature. The filaments are hot-drawn and heat-treated after extrusion. No formaldehyde after-treatment is used (which is one way to insolubilize PVA). The fiber owes its good hot-water resistance to its high degree of orientation and crystallinity.

The other Airco PVA fiber is Vinal 5F, a wet-spun acetylated type, currently being turned out at a 30-million-lbs./year clip by Japan's Kurashiki Rayon Co. It's finding use abroad in fish nets, clothing, belting, etc. Both Vinal FO and 5F, which originated with Kurashiki, are still in the market development stage in the U.S.

Meanwhile, Airco's Fiber Dept. manager, Richard Wells, reveals that a range of new PVA modifications are getting a hard look in Airco's labs, although details aren't yet being offered. One possibility: PVA produced from syndiotactic haloacetates.

When Airco's new fibers debut, it's expected they'll be priced at 85¢-$1.10/lb., and that about 70-85% of the output will be for industrial uses.

Others on the Way: Apparel uses are the objective of Arnel 60, a new cellulose triacetate staple, said by B. Sheldon Sprague, of Celanese's Summit, N.J., research laboratories, to be "in an advanced stage of development." The original Arnel, launched in late '54, was designed to have several advantages over secondary cellulose acetate—the acetate fiber commonly used in apparel, furnishings, etc. Its big advantage is washability, stemming from Arnel's resistance to saponification. It can also be ironed at higher temperatures than can conventional acetate.

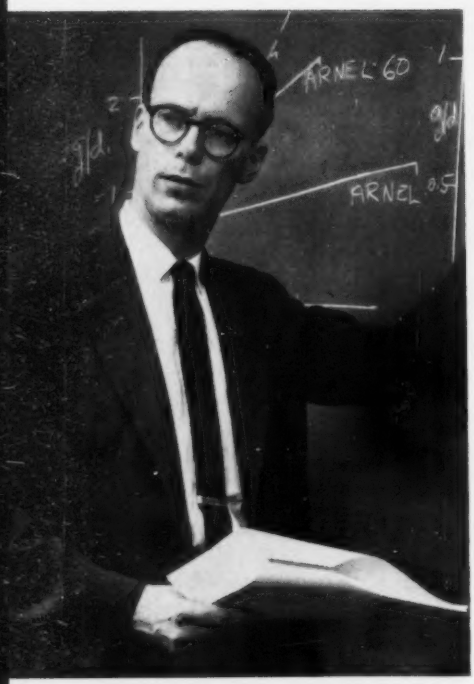
But Arnel, like the other acetate staple, lacks sufficient strength to be spun into low deniers, is restricted to use in heavier fabrics. Arnel 60 overcomes this limitation. Compared with Arnel, it is a smooth fiber, possessing a circular rather than a crenulated (nonuniform) cross-section. It has a higher dry strength, and can be spun in deniers as low as 1.5, while retaining all of the older Arnel's desirable properties. This opens up uses for the fiber in lighter fabrics.

The increase in strength derives from an increase in the molecular orientation of Arnel, according to Sprague, with no significant accompanying change in crystallinity. It's expected to have the wrinkle resistance and hand of acrylic and polyester fibers in certain fabric constructions.

One surprise, says Sprague, is Arnel 60's dyeability. Changing the fiber's structure to increase its strength might be expected to lower the rate at which it can be dyed. That's the case with other fibers such as nylon, Dacron, and the acrylics. But the dyeing rate of Arnel 60 and the older Arnel is about the same.

Molecular juggling is the secret, also, of a new rayon called SM27 (*CW, March 21, '59, p. 87*) by Courtaulds (Alabama) Inc. (New York). It has higher crystallinity and a higher degree of polymerization than has normal rayon, and is round, rather than crenulated, in cross-section.

Unlike rayon, SM27 retains most of its strength when wet and it withstands caustic soda—important in mercerizing blends of viscose and cotton. Although 463 million lbs. of rayon were consumed in the U.S. in '59, these



Celanese's Sprague links Arnel 60 properties to molecular orientation.

failings kept it from even bigger markets. For example, rayon's traditional weakness to caustic prohibits continuous machine vat dyeing of the fabric, since the dye must be applied in highly alkaline form. Plain weave SM27 fabrics withstand this treatment and subsequent mercerizing.

While Courtaulds (Alabama) concedes that SM27 is no "all-purpose fiber" ("No fiber is," it maintains), the firm expects the newcomer to enter markets hitherto closed to rayon, particularly in blending and combination with other fibers, and in wash-and-wear garments.

All-purpose fibers, in fact, may be a thing of the past, if indeed they ever existed. Cotton and wool might have deserved the title a few generations ago, but continuing research, notably by the U.S. Dept. of Agriculture, has been fitting even these fibers into specialized uses.

Few new, general-purpose fibers are expected in the next decade, according to Andrew Buchanan, Jr., general manager of Du Pont's Textile Fibers Dept., in a recent speech at the annual meeting of the American Cotton Manufacturers Institute in Bal Harbour, Fla. Instead of new fibers, though, Buchanan predicted that the next decade in the man-made fiber industry will be characterized by "unprecedented proliferation of fiber types, each designed to bring something new to some area of the textile industry." The textile industry is helping to bring about this diversification, according to Buchanan. Changes in spinning, in combing, and in similar operations permit handling of a wider range of fibers. Meanwhile competition (e.g., from paper, plastics) is cutting into textile markets, forcing savings wherever possible.

Du Pont, for one, anticipates that as many as two-thirds of the fiber products it will be selling in the next five or six years "will be new improvements on or additions to the products" the company is offering today. Almost 50 of these items are in various stages of evaluation or commercialization. (Latest: Type 288 nylon designed specifically for commercial texturizing.)

It's a safe bet that most fiber producers are similarly hedging against the future—when fibers will be fighting it out more than ever on a basis of cost and performance in specific jobs.

Stress on Individuality

Suggestions for increasing the efficiency of individual researchers were outlined recently by Charles Thomas, new chairman of the board of Monsanto Chemical Co., at a Chicago meeting of the Drug & Chemical Society.

The best way, said Thomas, is to run the labs by principles rather than rules. This means that management reserves the right to decide what must be done, but the individual researcher retains the responsibility for working out the means.

Communication between management and researchers at Monsanto is aided by two innovations: (1) the firm has appointed a recognized and practicing scientist as an advisory "outrider" to top departmental management; (2) it has given group leaders autonomous authority to handle most issues brought to their attention. This curtails red tape, reduces some causes of irritating situations.

Another means of boosting morale: if a Monsanto researcher comes up with a sound, potentially valuable idea, the company allows him up to two years away from his regular assignments to develop the idea.

Pay scales are not ignored, of course, in making the job more attractive to researchers, and the company's senior-scientist program (*CW, Feb. 13, p. 29*) essentially removes any money ceiling.

Pointing Up the Problem: Researchers' basic problem, as pointed up in a recent survey cited by Thomas, is that they are generally dissatisfied with their particular jobs. Thomas pegs the heart of the trouble as the "individual vs. group" conflict brought about by the training of the modern scientist as a free-wheeling, nonconformist thinker, and because of industry's general requirement that he work in a team-effort atmosphere within "systematic parameters."

Thomas doubts that the problem can ever be completely solved, but counts even a little improvement as a good thing.

Soviet Plastic Plaint

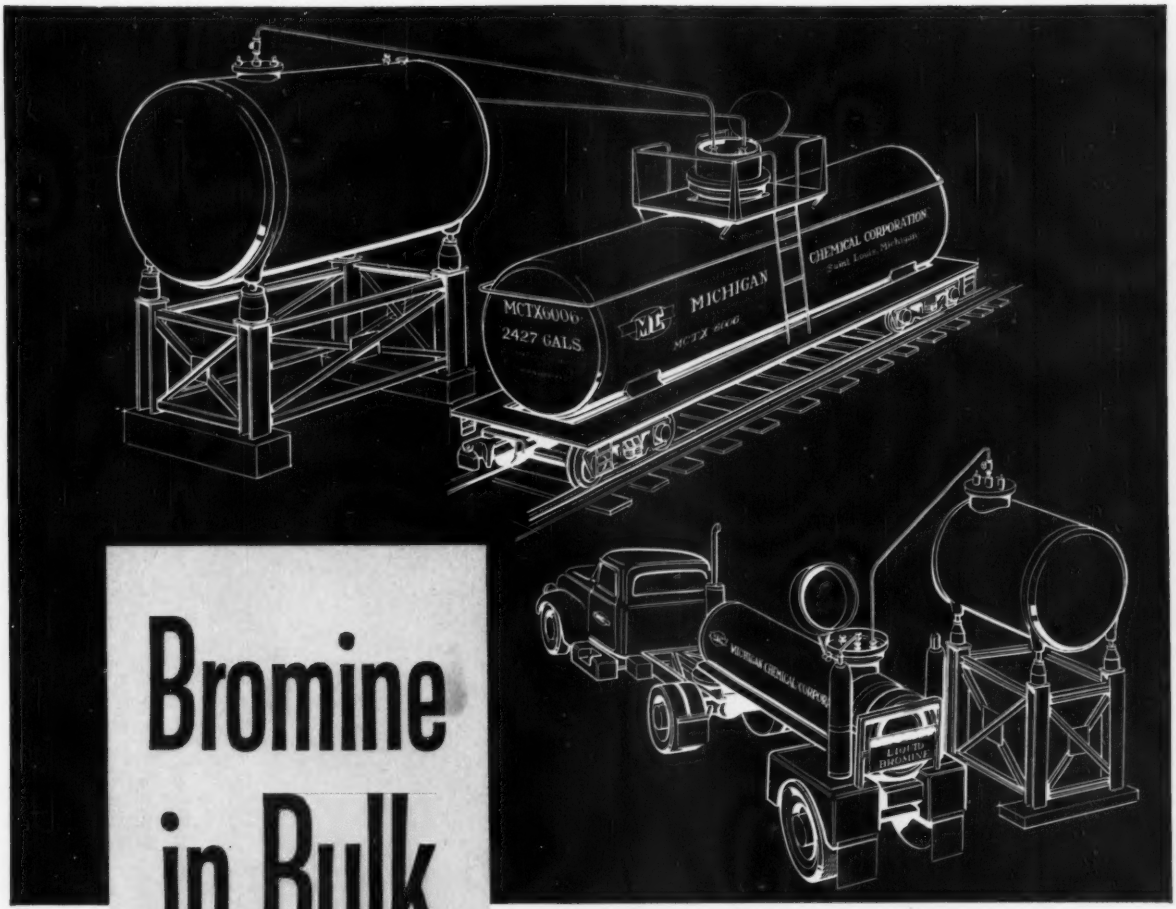
Latest reports by three top Soviet polymer experts on the state of present-day Russian plastics technology may well contain food for thought for U.S. polymer producers. In a recent *Pravda* article, the Russian researchers said that improvements in existing polymers are needed — but are being overlooked in their country's race to produce brand-new materials.

The scientists — V. Kargin, V. Smirnov and M. Rokhlin — warned against any tendency of the Soviet chemical industry to overemphasize development of new polymers while it lags in making the most of existing technology.

They pointed out that improvements in existing materials can be so great "that the material fundamentally alters its properties and begins to compete successfully with products that have recently been brought out and are held to be more progressive."

Polyvinyl chloride was cited as a prime example of a polymer that has been improved considerably outside of the Soviet Union. "Yet," say the scientists, "the quality of our polyvinyl chloride unfortunately remains the same as it was 10 years ago."

Among the improvements called for: purer starting materials, more closely controlled production, more use of special additives.



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Researchers check first fuel element fabricated for nearly completed plutonium recycle test reactor.

Readying Plutonium for Economy Test

Technicians at the Atomic Energy Commission's Hanford, Wash., reactor site are shown inspecting the first fuel element (above) fabricated for use in the plutonium recycle test reactor scheduled to be completed this summer. Objective: to show the feasibility of using plutonium to enrich the fuel in power reactors.

Since plutonium is produced by uranium-fueled reactors, success of this research project would allow recycle of the plutonium, cut fuel costs. In addition, plutonium enrichment could allow the use of smaller reactors and combine long reactive life with high specific power, without incurring the high costs of producing enriched uranium.

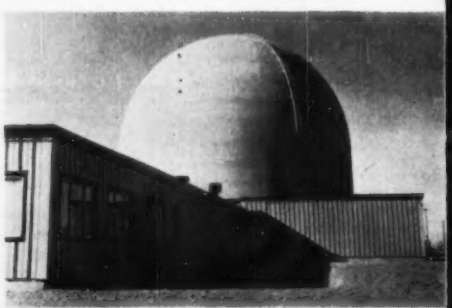
The fuel element, first of 85 to be made for the $15-million reactor, is a 19-rod cluster of tubes fabricated by a new method. Aim: to make the fuel more dense. Fuel material in this element (as it will be in 59 others) is uranium dioxide. A plutonium-aluminum alloy will be used in the remaining 25 elements.

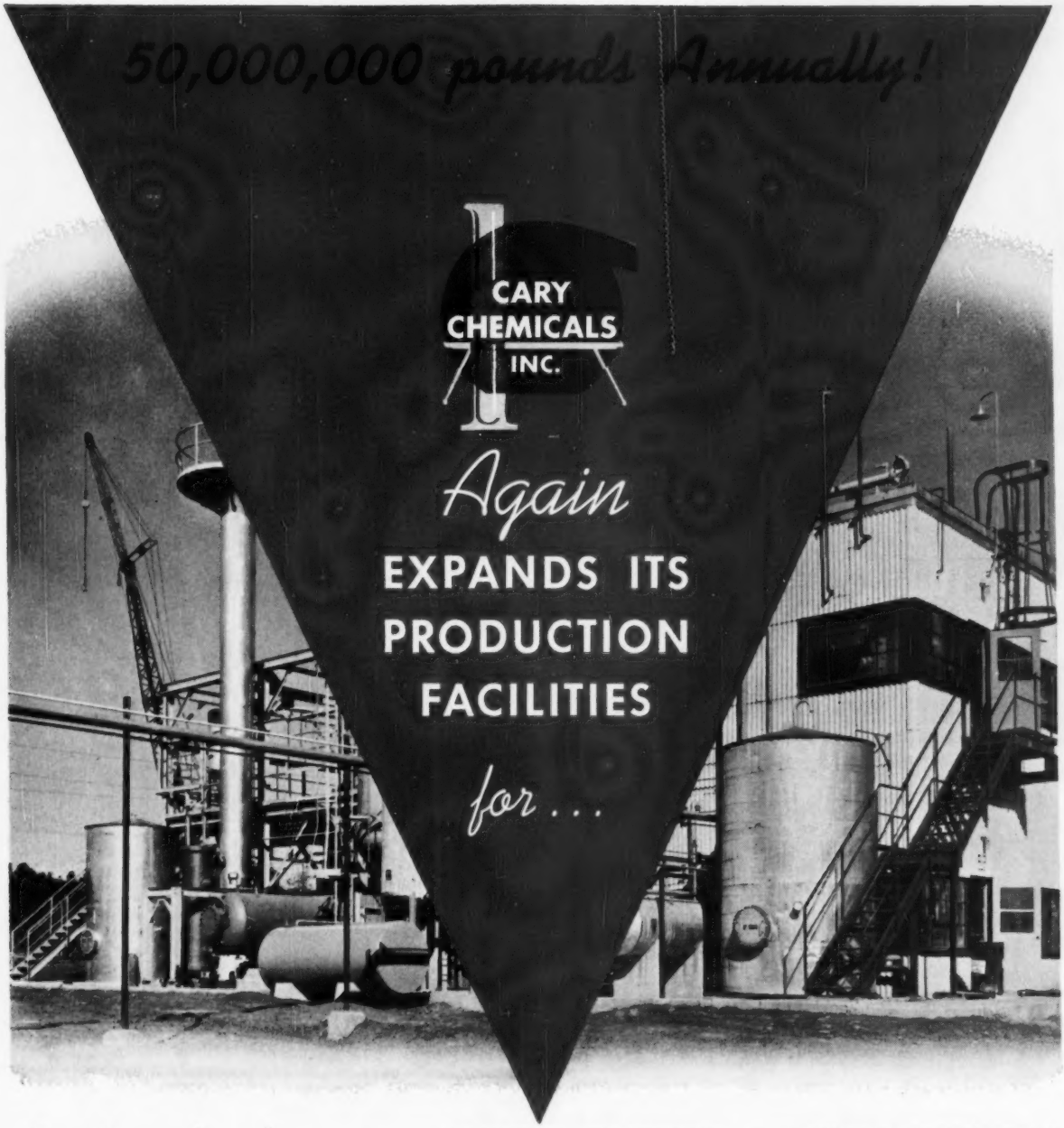
Denser Fuel: Density of the fuel in the new element was increased from 65% of theoretical to about 90%. Method: about 6½ lbs. of uranium oxide powder was loaded into a Zircaloy tube, which was agitated to compact the powder, then closed off. Final densification was accomplished by swaging, a process in which tube diameter and length are both reduced.

The finished element was made by capping the tubes, wrapping them spirally with Zircaloy wire and bundling them together. The wire wrapping separates the bundled tubes so that the coolant can circulate freely.

Private Effort: Plutonium is also being studied for fuel use by a private firm, Nuclear Materials & Equipment Corp. (Apollo, Pa.), which opened a privately financed, $1-million laboratory for this purpose early this year. Numec is also studying plutonium for the AEC under a $2.6-million contract, seeking to develop a complete fuel cycle for plutonium oxide.

Similar contracts, relating to plutonium carbide, have also been awarded to Nuclear Development





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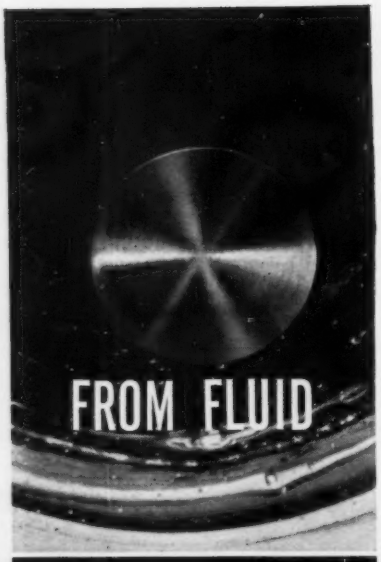
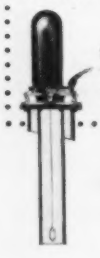
VINYL RESINS — VINYL COPOLYMERS — VINYL COMPOUNDS — SPECIALTY WAXES — HIGH MELTING POINT SYNTHETIC WAXES



TO YOU

Brookfield Viscometers Cut Viscosity Measurement Time To 30 Seconds

It's true! Just 30 seconds* in test material, and the Brookfield 8-speed Synchro-lectric Viscometer gives an accurate viscosity reading in centipoises. Brookfield has made viscosity a product dimension that you can control with accuracy, speed and ease. Being portable, you can use Brookfields anywhere . . . in the laboratory, field, or on the process site. New illustrated catalog, including interesting tips on viscosity control, is yours upon request.



Viscometran, new instrumentation that automates viscosity control under actual process conditions.

Brookfield

ENGINEERING LABORATORIES INCORPORATED

STOUGHTON 214, MASSACHUSETTS

RESEARCH

Corp. of America (White Plains, N.Y.) and Carborundum Co. (Niagara Falls, N.Y.).

Commercial nuclear power is a good way off, but successful plutonium research will help bring it nearer.

PRODUCTS

Drug Find: Schering Corp. (Bloomfield, N.J.) has a new prescription oral diuretic, called Naqua, for treating edema due to congestive heart failure and other causes. It's a benzothiadiazine derivative.

•

Detergentproof: A new polyethylene molding resin offered by U.S. Industrial Chemicals Co. (New York) is designed for use in detergent bottles. It's called Petrothene 101, features high stiffness, stress-crack resistance.

•

Active Magnesia: Pilot-plant quantities of a new, active form of magnesium oxide are now being produced by International Minerals & Chemical Corp. (Skokie, Ill.). The new grade is aimed at applications in neoprene compounding and other uses that require small particle size (under 2 microns), high reactivity and purity (iodine number: 100-115).

•

Dry Solutions: Commercial Solvents Corp. (New York) has applied for patents on its new Dri-Sol line of ammoniating solutions, featuring a water content of 0.5%. The solutions, for use by fertilizer manufacturers in preparing mixed plant foods, are available in grades ranging from 24% ammonia to 76% ammonium nitrate to equal parts of each. Conventional ammoniating solutions contain 6-12% water. The new solutions permit greater and more effective control over the liquid phase and other aspects of mixed fertilizer production.

•

UV Absorbers: General Aniline & Film Corp.'s (New York) Dyestuff and Chemical Division is offering two new ultraviolet absorbers, Uvinul N-35 and Uvinul N-38, chemically identified as substituted acrylonitriles. They're designed for protecting nitrocellulose lacquers against ultraviolet degradation, may be of value in other systems such as butadiene-styrene latex, melamine-formaldehyde, urea-formaldehyde, epoxy-amine and nylon formulations.

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America's leading shellac users call on Mantrose, the nation's largest *shellac* research and production center, to "custom-tailor" natural shellac to fit today's exacting processing or finishing conditions.

Mantrose imports the finest seed lac. Then chemists and processing experts "design" it into *new* shellacs. The unduplicated superiority of natural shellac is now further enhanced with brand new advantages and controlled processing characteristics to improve *your* end products.

Chemists and consultants from the Mantrose Laboratories will be glad to discuss how a Mantrose shellac can better suit your processing needs. There is no charge for this service.

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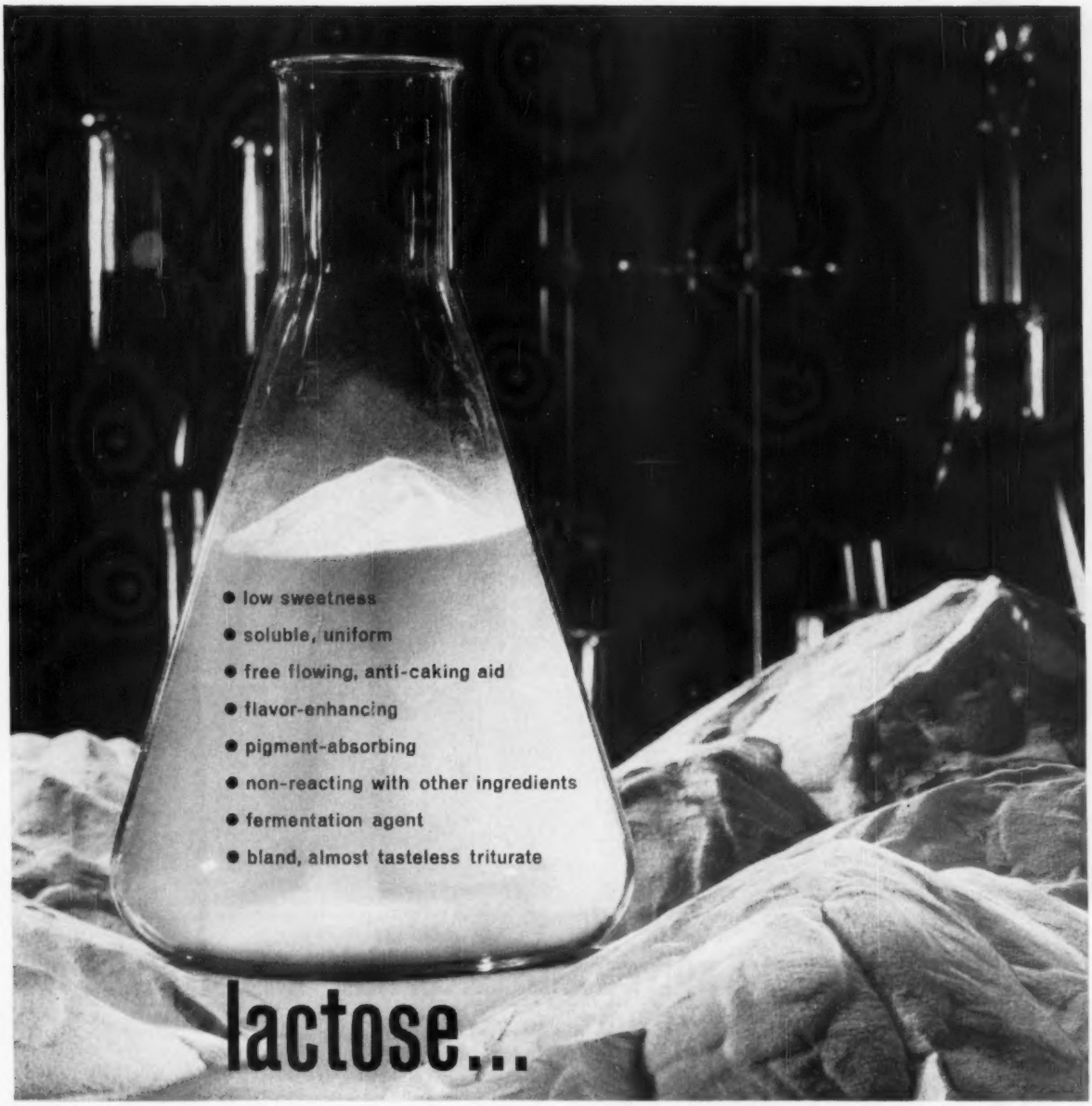

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Only Western can supply you with all forms of Lactose—five grades, ten granulations. Strict chemical and bacteriological specifications and a rigid quality control program assure highest quality.

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Appleton, Wisconsin

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Distributed Nationally by Chemical Department, McKESSON & ROBBINS, INC.

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*Commonwealth of Virginia, Hampton Roads Sanitation District Commission Treatment Plant at Foot of 44th St., Norfolk, Va.

Uscolite pipe solves an external corrosion problem for sanitation district

The Uscolite® pipe line installed in this treatment plant* carries 150 gallons a minute of a saturated chlorine water solution (actually treated sewage water) from the chlorinator to the main sewage line entering the plant.

Prior to installation of Uscolite, pipe severely corroded externally due to the chemical content of the soil and electrolytic action. *Uscolite has eliminated the costly maintenance and constant replacement of pipe.* Uscolite pipe was installed above and below ground because it is rigid enough to resist soil pressure, yet flexible enough to follow earth contours. UscoWeld† Fittings were installed in a fourth the usual time, saving many dollars. The welds are as strong and permanent as the pipe itself. Clamp-type fittings that leak, pull off and impair flow are never needed. *Not one foot of Uscolite Pipe has ever failed in service, when used in accordance with our recommendations.*

USCOLITE ELIMINATES COSTLY PIPE INSTALLATION

Superintendent of this plant says: "The simplest 'big' piping job we ever performed. Four men laid 1000 feet of 6" pipe per day without a sweat."

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When you think of plastic pipe, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial plastic products.

†Patent applied for

Mechanical Goods Division

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Technology
Newsletter

CHEMICAL WEEK
April 23, 1960

Add Stauffer to the list of nitrogen-fluorine propellant producers. The company announced last week that it has prepared pilot-plant quantities of nitrogen trifluoride and tetrafluorohydrazine (dinitrogen tetrafluoride) and, like Thiokol, it claims to have developed improved process techniques (*CW Technology Newsletter, April 9*). Air Products is already producing nitrogen trifluoride on government contract.

The considerable interest in nitrogen trifluoride may be based on its ability to develop greater thrust than chlorine trifluoride. Although nitrogen is only a carrier for the fluorine, and chlorine does add to thrust, the low molecular weight of nitrogen may more than offset the thrust contributed by higher-weight chlorine.

•

Bioferm Corp.'s (Wasco, Calif.) Thuricide has become the first microbial insecticide to obtain federal registration and exemption from a tolerance requirement (residues left on crops after harvest are regarded harmless to humans, animals, birds and fish). The pest control agent previously held a temporary exemption from a tolerance and an experimental permit for shipment and large-scale testing (*CW, Dec. 20, '58, p. 36*). The test program was carried out jointly by Bioferm and Stauffer Chemical, which will market the product in two formulations—a wettable powder and a dust. U.S. Food and Drug Administration says Thuricide may be used on 12 food crops and tobacco. Insects against which the product is said to be effective: imported cabbageworm, cabbage looper and the tobacco hornworm.

•

Dow Chemical claims it has improved its cold-cleaning solvent for degreasing metal parts, electrical equipment and some plastics. The solvent, called Chlorothene NU, has greater resistance to decomposition, can be reused through reclamation in standard distillation units rather than in stainless steel or Heresite-lined equipment.

•

Production of ketones and aldehydes is promoted by palladium catalyst, affixed to silk, according to work at Japan's Osaka University. These catalysts are said to be particularly suited for preparing saturated aldehydes and ketones from corresponding unsaturated compounds by hydrogenation. The catalysts are made by saturating the fibers with palladium chloride then reducing the salt to metal using hydrogen. Silk fabric is used because it's light, has a high ignition point, and permits ready passage of reacting chemicals.

•

A new killed-virus polio vaccine that's highly potent, free from detectable monkey kidney tissue (possibly hazardous) was reported this week by Merck, Sharp & Dohme (West Point, Pa.), division of Merck & Co., Inc. Vaccine has produced an immune response to all three types of polio

virus in 91% of the children in clinical trials after two doses, compared with 63% scored by commercial Salk vaccine.

Details of the new vaccine were presented by Merck's Maurice Hilleman at the 1960 Symposium on Polio Vaccine in Newark, N.J., sponsored by Academy of Medicine of New Jersey, The National Foundation, The Medical Society of New Jersey, and the New Jersey State Dept. of Health.

•

Evaluation of new refrigeration processes will be one of the goals of a new research effort at Battelle Memorial Institute (Columbus, O.). Operating under a one-year contract from the Air Force's Rome Air Development Center, Battelle will include both established and experimental cooling systems in its study. Among them: high-speed centrifugal compressors, Peltier cooling units, and the Stirling and azeotropic cycles. The Air Force's immediate interest is in improving the over-all effectiveness of ground-based electronic equipment.

Southwest Research Institute is also researching cooling systems, hopes to come up with a full-scale, air-cooled, direct-fired, double-effect lithium bromide air-conditioning unit for test runs by late summer. The San Antonio institute had previously shown that the double-effect evaporation principle resulted in improved performance over the conventional, single-effect lithium bromide cycle and the ammonia-water-fixed gas process. But the work was with water-cooled equipment; there is now a shift in emphasis to air-cooled units.

•

Promising research in cholesterol-lowering compounds was reported by Eastman Kodak's Distillation Products Industries (Rochester, N.Y.) at last week's meeting of the American Institute of Nutrition in Chicago. DPI researchers David Herting and Philip Harris say that two plant sterol derivatives have shown greater effectiveness than the original sterols in lowering tissue levels of cholesterol in rats. The new compounds—soy steryl polyethylene glycol 1000 succinate and the potassium salt of soy steryl-2-carbamatoglutaric acid—are next slated for clinical testing for their effects in human beings.

•

A new herbicide aimed specifically at weeds in cornfields is now being marketed by Monsanto Chemical Co. (St. Louis). Called Randox T, it's a pre-emergence material that kills both broadleaf and grassy annual weeds at a cost of about $3/acre. An older compound, Randox, is still available for treating grassy annual weeds alone.

•

Fluor Corp. Ltd. is closing its research facilities at Whittier, Calif., and absorbing research technologists into other company divisions as part of a cost-reduction program. The company, which revealed a loss of $229,278 at its annual meeting (*CW, March 26, p. 87*), still hopes to reverse the trend in last-half '60. It will continue some research activities—for example, in process development and the wood products division.

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For vinyl plastics that must perform at extremely low temperatures, there are three special plasticizers, FLEXOL A-26, 10-A, and TOF. These are used to make vinyl plastics that are both impact resistant and flexible at temperatures as low as −70°C.

In some cases, CARBIDE has developed a plasticizer for a single use. For example, FLEXOL Plasticizer 3GH is used for the polyvinyl butyral interlayer in safety glass. This plasticizer increases adhesion and eliminates the need for edge sealing. Besides FLEXOL 3GH, CARBIDE produces six other special-purpose plasticizers, FLEXOL 3GO, 4GO, 8N8, R-2H, and B-400.

All 15 FLEXOL plasticizers are available from distribution points throughout the country. And, because of CARBIDE's wide variety of plasticizers, you can take advantage of the savings from combination tank car, tank wagon, and drum orders in LCL or carload orders. For more information on FLEXOL plasticizers, call the nearest CARBIDE office or write Department B, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Ave., New York 17, New York.

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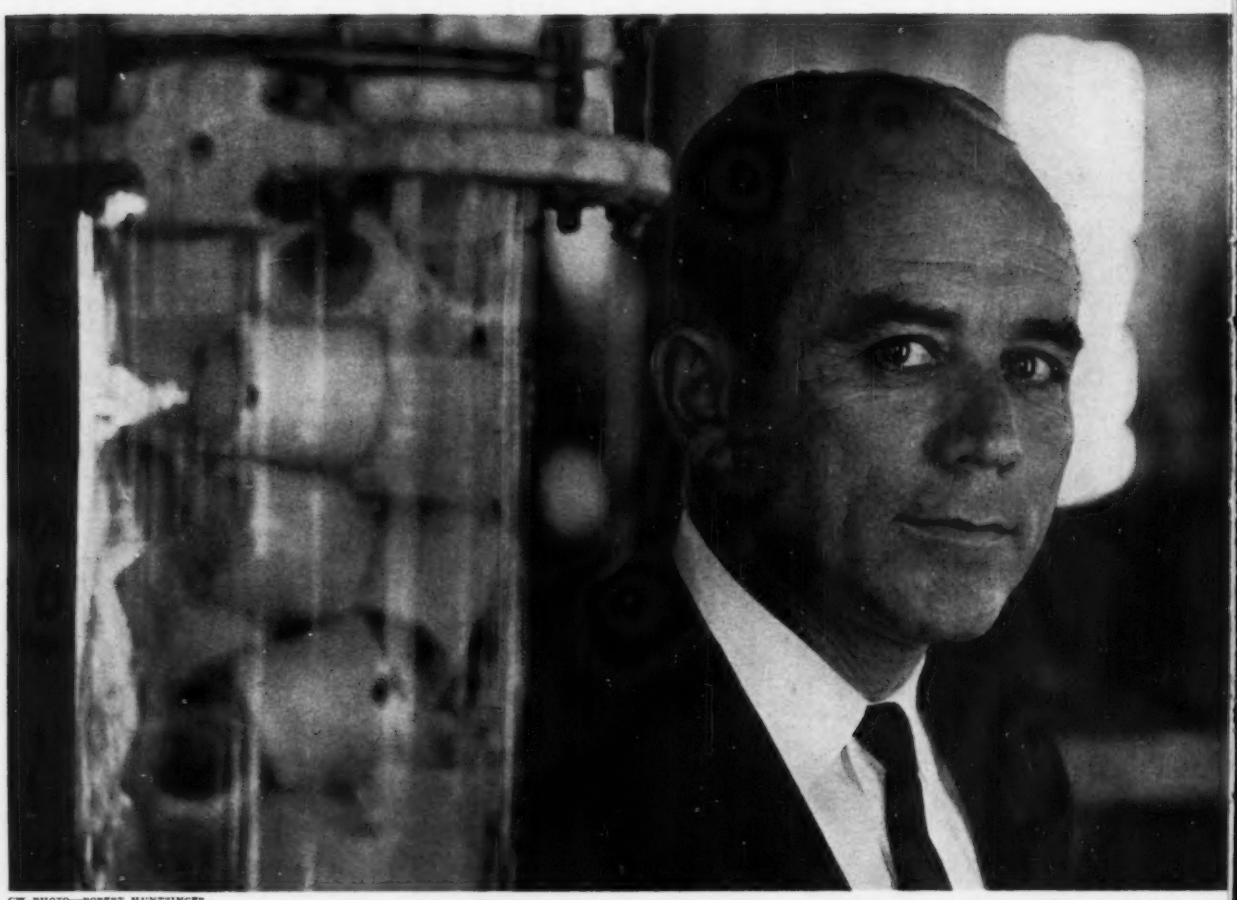


CW PHOTO—ROBERT HUNTZINGER

Nease's President Nease pauses reflectively on inspection trip of plant (left) and new office building

Nease's Small-Firm Formula: Grow,

When shareholders of Nease Chemical Co. assemble next week at State College, Pa., for the firm's annual meeting, company President Aubrey Nease will be ready for them, armed with an impressive list of last year's accomplishments, next year's plans. The most striking: the firm has built sales to $3 million—with 12-14% profits—in about eight years, and in toughly competitive fields for small companies.

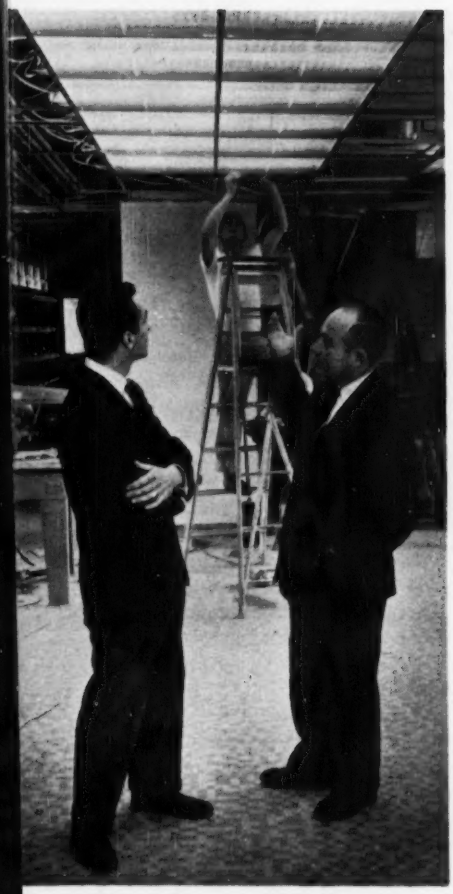
Nease, whose two major aims are growth and independence, is apparently much more interested in building his company into a strong CPI factor than in making a quick gain for himself. Still, gains have been sizable — over the past seven years he has brought initial investors a 90-fold appreciation and has steadfastly shunned absorption by bigger firms.

The 70-man company is still strongly on the growth trail. Nease this week is purchasing Neochem Products Co. (Neosho, Mo.) as a wholly owned subsidiary. The subsidiary will market a new rodenticide, Diphacin, Nease's first consumer product. Other actions coming up:

- Ground breaking will take place at the end of this month for a new multiproduct manufacturing plant near Wingate, Pa.
- New $75,000 executive headquarters and research laboratories will be opened early next month adjacent to the present manufacturing plant at State College.
- Construction will begin within a few months on new offices at Fernald, O.

Nease Chemical's corporate image reflects the personality of its president, who refuses to run with the pack. His philosophy has yielded an easily discernible payoff to stockholders and the company. Nease has posted a better-than-75% average annual rate of sales increase since it started. Last year the company showed a 13.2% net profit on its sales of $3-million—a margin most companies envy, few match.

Not for Sale: During the past four years Nease has turned down purchase bids from about 50 customers, competitors and others. The company's record, says Nease, makes it attractive to larger corporations, al-



(right), with assistant Eaken.

Go It Alone

ways anxious to complement their lines.

Most recent proposal — and it made Nease hesitate "for a few moments" — came from a large investment banking firm. "From a dollar standpoint, most companies would have succumbed," Nease believes, but he's determined to remain independent. Rather than having to play ball on somebody else's team, Nease is aiming for the big leagues on his own.

High Profit Worries: But if the company's profit margin is attractive to some, it's a source of bother to others, namely a few board members and stockholders who fear it could cause the loss of sales. For example, says Nease, who characteristically doesn't worry about it at all, one of Nease's biggest customers once questioned the usual 12-14% net profit, which the company almost flamboyantly maintains. "But," Nease explains, "our prices were competitive. We got their contract."

Nease welcomes competition, and more than 90% of the business is competitive. Most of it is repeat business, about 70% being under contract. Nease points out that "although our competitors operate on a 5% profit margin, we can do better because we're more efficient."

Its product mix: 70% is pharmaceutical intermediates; 20% is detergent intermediates; the rest is special order work.

Organization Men: Nease's penchant for individuality extends to his management team. He believes the company's efficiency stems from a solid management core. "We have the management nucleus of a larger organization," says Nease, referring to the company's somewhat top-heavy structure, "but we're heading for bigger things and we'll be ready for them, as far as our management is concerned."

His management nucleus makes up the company's active board of directors — Rod Eaken, assistant to Nease; a mechanical engineer and two production engineers; four research chemists and the purchasing agent. These men would rather double in brass than see the company stay small. For example, company engineers design and help build facilities, the PA doubles as pilot for the company plane.

Indeed it was the large organization aspect that was mainly responsible for the company's changing its name from Pedlow-Nease Chemical Co. In '56, Nease's partner, Wesley Pedlow, thought the company was growing too large, away from the original concept he and Nease had had (*CW, Oct. 31, '53*). Because he was more optimistic about the company's future, Nease bought out Pedlow's interests, determined to carve a place for his company in the chemical process industries.

Manpower below the top level is important too, Nease stresses: "We've never had a man quit, only had to let a few go. We're not unionized, and most of our men work more than the guaranteed 40 hours, since usually we're on a seven-day week."

Absentee Ownership: But the small organization presents its problems. "If you want to see Aubrey Nease," say his associates, "you stand a better chance of running into him anywhere but at his company's four locations." Nease is on the go most of the time — sometimes even selling—throughout the country and abroad, where the firm has small but growing interests. In addition, he is president of Phillips-Foscue Corp. (High Point, N. C.), a manufacturer of flexible polyurethane foams, in which Nease Chemical Co. owns a 20% equity interest.

With such demands on him Nease finds solace in the fact that the company's not faced with two of the usual problems of a small outfit, financing and sales. "Our biggest problem is time," Nease asserts. "We are all extremely busy and under pressure. I guess we're taking another step in growth. Soon we'll require a substantial increase in personnel."

A Basic Future: Nease's chosen spot in the industry is basically one of independence, since his business depends mostly on the quality of products sold, rather than the fickleness of the consumer public. Some trade sources eye Nease with envy. In sum, they say, the company's intermediates position is tops: "It's close enough to finished products for a high markup but far enough away from consumer products to have no promotion and merchandising worries."

Nease makes big plans and gets his company to follow through, as evidenced by company growth. He sees the company's future as continued expansion in its present type of work but with increased emphasis on research, designed "to give us a more basic position in industry." Nease foresees "no pioneering of fields, but I think there are certain areas where we could gain industry identity with certain products." He'll push for more pharmaceutical intermediates, more end-products suitable for marketing by others.

Nease's plans, he thinks, have been successful thus far. For the future: grow big, become strong, go it alone — Nease is not for sale.

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Haze in Death Valley

Furnace Creek Inn, U. S. Borax & Chemical Corp.'s plush Death Valley, Calif., resort, last week came under the glare of a House investigating committee searchlight in Washington, D. C. The committee is looking into a million-dollar land deal involving National Park Service land and the inn.

The Government Information Subcommittee is asking why documents about the deal are being withheld under "executive privilege" by the Interior Dept. unless there are some "questionable practices" involved.

The National Park Service owns 200 acres upstream from Furnace Creek Inn and planned to build a headquarters, museum and recreation area on it. U. S. Borax, apparently fearing that precious water would be diverted from its resort, reportedly offered the Park Service 400 acres downstream in exchange for the 200 upstream acres, with promises to leave plenty of water.

The subcommittee is trying to get hold of a 66-page memo prepared by an Interior Dept. solicitor. The department says it contains not only legal references to the land deal but also "allegations, partly by innuendo, against career government officials of every administration since 1927."

Interior is considering turning the memo over to the Justice Dept. for possible litigation. For this reason it has refused to let the Congressional committee see it.

Antipollution Auto Law

California, front-running state in legislative attacks on smog and air pollution, has passed a much-discussed bill that will eventually require installation of exhaust-control devices on automobiles registered in pollution-plagued counties.

At least two process-oriented firms may benefit from the markets that the new law may create, according to observers. One is Universal Oil Products, which has developed a catalytic exhaust purifier, called Purezaust, that UOP claims can last for 20,000 miles of driving. The other firm is Thompson-Ramo-Wooldridge, which, in conjunction with the Chrysler Corp., has produced a mechanical afterburner supposed to last the life of the car. Although the firms won't comment as yet on prices of the products, rough estimates are $50 for the catalytic device, $150 for the afterburner.

There may be other accruals to CPI firms. The California legislature turned down a proposal to build a laboratory for the testing of exhaust devices, will instead farm work out to private firms.

No Brandname Ban

Despite sporadic reports of renewed interest by state governments in urging substitution of generically named drugs for tradenamed ones, a CHEMICAL WEEK check of major drug manufacturers shows little worry that the problem will worsen.

The generics-vs.-brandnames battle has been getting more attention since the Kefauver hearings on drug pricing began. Witnesses suggesting that patients ask their doctors to prescribe drugs by the lower-priced generic name, rather than by the higher-priced brandname, were given widespread publicity.

As a result, reports have circulated that a number of states are considering more rigid enforcement of their directives urging welfare agencies, hospitals, and the like, to use generic titles whenever possible.

Drug manufacturers are worried that Michigan, Pennsylvania, Ohio and California — among others — are discussing making such substitutions compulsory. Already, for example, New York state lists a number of brand drugs that it considers can be replaced with generics, and so does Massachusetts.

Action, Reaction: Further stirring up the industry were two directives issued in the past few months in Connecticut. The first was a letter from the director of the Connecticut welfare department to the state's doctors and pharmacists. In the letter the department said it "cannot pay for tradename drugs when non-tradename equivalents are available at lower prices." The letter conveyed the department decision that "the regulation must be fully and firmly enforced."

Drug firms, doctors and pharmacists sought further clarification, since state law prohibits pharmacists from substituting one drug for another on prescriptions. A second letter from

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ADMINISTRATION

the welfare commissioner revised the first. In it, the department "strongly urged" physicians to prescribe in generic terms whenever possible. It went on to say that "the pharmacist is expected to supply such generic preparations at a reasonable cost that does not sacrifice quality. . . . It is required that, when a drug is dispensed and billed to the Welfare Dept. by its nonproprietary name, it must be equal in pharmacologic and therapeutic qualities to its tradename equivalent."

There is some concern by drug companies that such phraseology seems to put the choice of drugs squarely in the lap of the pharmacist. And he, they claim, is not equipped to make judgments they consider only doctors are competent to make. Companies claim, moreover, as did Olin Mathieson's E. R. Squibb Division in a widely publicized letter, that such directives infer that just because two drugs have the same generic name they are identical in quality or effectiveness.

Expectations: Although interest in the subject seems to have renewed, only a few states have taken specific steps, and drug companies aren't too upset. With the exception of Squibb, none has made a public show of its attitude toward the Connecticut directive, and none report active efforts to step up campaigns against such directives.

LABOR

No Change: At Union Carbide's Texas City, Tex., plant, Local 10, Process and Control Engineers Union, failed to upset incumbent Local 711, Texas City Metal Trades Council, as bargaining agent for 1,900 workers. In a decisive election, the trade council got 1,163 votes, PACE received 451, while 157 employees voted for no union.

•

Borax Hike: U. S. Borax & Chemical and Local 85, International Chemical Workers Union, at Boron, Calif., have agreed on a new contract calling for a wage increase averaging 25¢/hour over a two-year period. The 25¢ package represents a 4% increase of present base wage rates during each of the two years of the new agreement, plus payment by the company of additional premiums for hospital-medical surgical costs. The new contract was settled two weeks prior to the expiration of the union's old contract.

•

Construction Contract: The first contract signed this year between a major construction craft union and a contracting group is a two-year pact between Gulf Coast Piping Contractors Assn. and Pipefitters Local 195. Agreement calls for a possible maximum 25¢/hour increase — 12.5¢ at once and 12.5¢ a year from now — in wages or pension payments, at the discretion of the union.

KEY CHANGES

Ira W. Hutchison to president, Dow Corning International S.A., new subsidiary, Dow Corning Corp. (Midland, Mich.).

Michael G. O'Neil to president, **Thomas F. O'Neil** to vice-chairman, board of directors, **John O'Neil** to chairman, finance committee, and **L. A. McQueen** to executive vice-president, General Tire & Rubber Co. (Akron, O.).

Sidney D. Kirkpatrick and **Dallas S. Townsend** to board of directors, General Aniline & Film Corp. (New York).

Roy V. Schwab to chairman of the board, **E. V. Staude** to president, **Leonard deKarr** to executive vice-president, Brunswick Drug Co. (Los Angeles).

Harry B. Warner to president, B. F. Goodrich Chemical Co., division of The B. F. Goodrich Co. (Akron, O.).

W. Alec Jordan to board of directors, American Alcolac Corp. (Baltimore).

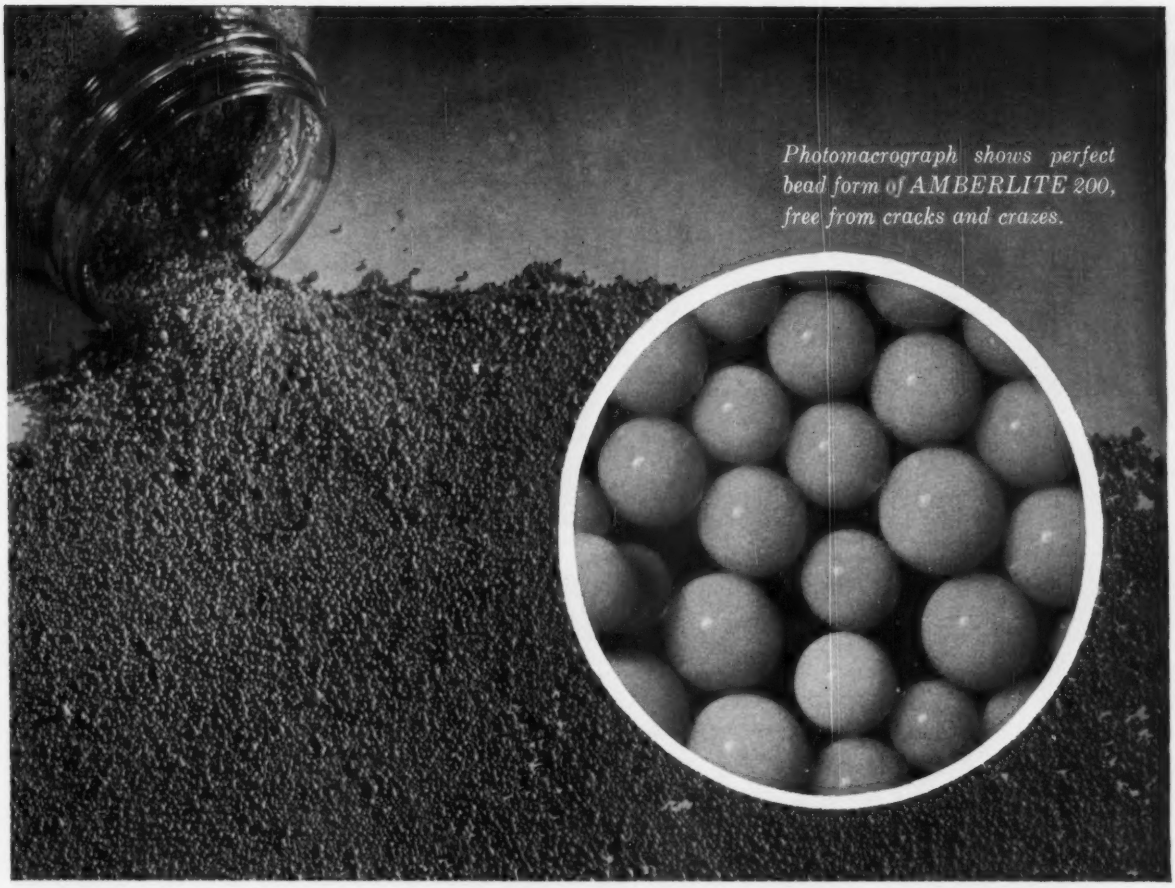
John W. Brice to president, Carter division, and **Joseph L. Seger** to vice-president, public affairs, parent company, Humble Oil & Refining Co., (Houston).

Kenneth C. Loughlin to president, **James R. Kennedy** to financial vice-president, Celanese Corp.

Quincy A. Shaw, Jr., to president, Bonneville, Ltd. (Wendover, Utah).

Leonard A. Pierce, Jr., to president, Brown Co. (Berlin, N.H.).

William B. Yarborough to vice-president, National Aniline Division, Allied Chemical Corp. (New York).



Photomacrograph shows perfect bead form of AMBERLITE 200, free from cracks and crazes.

AMBERLITE 200

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AMBERLITE 200 represents an entirely new concept in polymer chemistry. A high capacity, strongly acidic cation exchange resin, AMBERLITE 200 has physical and chemical stability unmatched by any available cation exchange resin.

These are some of the outstanding features of AMBERLITE 200 . . . *high resistance to oxidation,* especially in water containing chlorine, oxygen and metals such as iron, copper and manganese; *perfect bead form,* free of cracks and crazes; *high attrition resistance; stability over the entire pH range; insolubility in all common solvents.*

In addition to water treatment in either hydrogen or sodium cycle operation AMBERLITE 200 has unusual value in the treatment of highly concentrated solutions such as sucrose and glucose, where resin dehydration causes rapid failure of conventional exchangers. Resistance to oxidation makes AMBERLITE 200 useful in treatment of highly aggressive solutions such as chromic acid or where high operating temperatures are involved.

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THE RESINOUS PRODUCTS DIVISION

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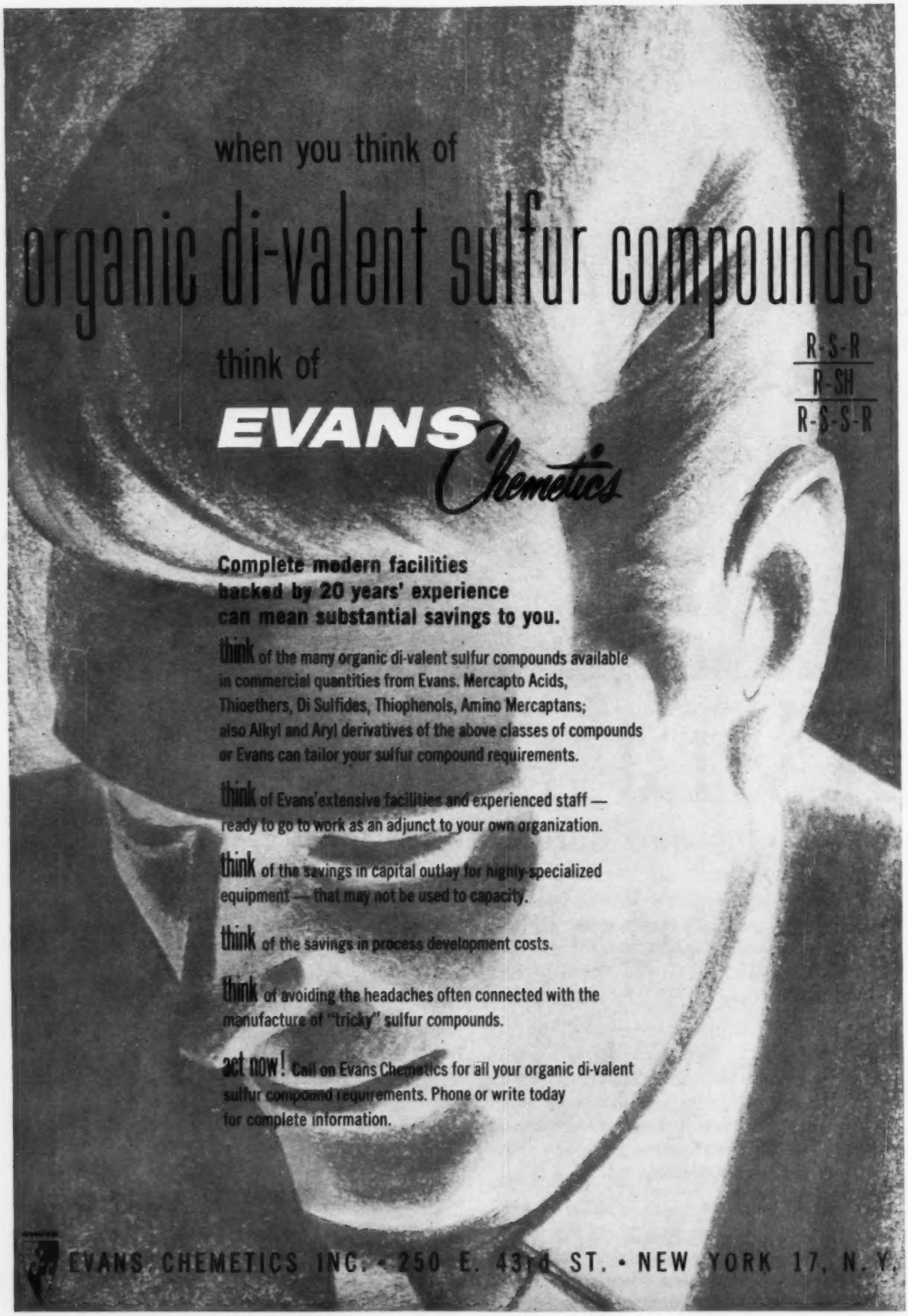
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Market Newsletter

CHEMICAL WEEK
April 23, 1960

Industry-wide increased prices for agricultural-grade potash —initiated by U.S. Borax & Chemical (*CW Market Newsletter, April 16*)— will likely be in effect by July 1. Late last week some producers indicated that new prices—about $1.80/ton higher than now—would be posted this week. Others were stalling to see how the higher tabs would be received, but expressed no opposition to the move. First to follow was Potash Co. of America, which posted a revised schedule early this week.

The revisions are not unexpected—there has been prolonged speculation that increases this summer were likely (*CW, July 11, '59, p. 87; CW Market Newsletter, Jan. 2*).

Pricing position of National Potash is unique among U.S. producers. Because of an unusual contract, it can only "go along" with price trends, not set by them. Reason: National last year contracted with Chicago-based Farmers Fertilizer Cooperative to have the co-op distribute virtually all of National's potash output at prevailing market tags (*CW, July 11, '59, p. 87*). The contract also says National can't initiate changes; in effect, it has no choice but to do whatever the potash industry decides to do.

•

Dow Chemical's fluorspar mill in Mexico will be completed early this summer by Dow's subsidiary, La Domincia S.A. de C.V. It's on the Rio Grande, near Big Bend National Park. La Domincia is now mining and stockpiling metallurgical-grade fluorspar ore from its Pico Etereo deposits, 25 miles from the mill. It will process the ore by conventional flotation methods. Output is pegged at 100 tons/day of acid-grade concentrate.

Concentrate will be trucked across the Rio Grande to a shipping terminal near Marathon, in Brewster County, Texas.

Dow's Mexican activities contribute to the general dominance of U.S. fluorspar markets by imports (*CW, April 9, p. 84*). Other U.S. firms reportedly interested in seeking Mexican fluorspar deposits—from which largest U.S. imports now come—include Alcoa, Reynolds, Du Pont, Pennsalt, and General Chemical.

•

A program to conserve U.S. helium—vital in defense needs—was approved last week by the House Interior Committee. It would be set up under a bill approved by the committee and follows, in general, the lines suggested by the Interior Dept. (*CW Market Newsletter, March 19*), which operates the government's helium plants.

Under terms of the bill—introduced by Rep. Walter Rogers (D., Tex.)—the Secretary of the Interior would be authorized to contract with private interests for purchase of helium at a fair market price. The

bill would also allow the Secretary to permit private ownership of helium properties and permit cooperative agreements, and authorize him to contract for helium production and research.

•

A 1,000-tons/day sulfur recovery unit is now onstream at the gas processing plant of Societe Nationale de Petroles d'Aquitaine (Lacq, France). A twin unit will be put into use in a few months, to bring SNPA total processing capacity to 750 million cu.ft./day, and sulfur recovery of 4,000 long tons/day.

•

Newest flexible packaging film is Kordite 1500, a heat-sealing, biaxially oriented polypropylene film said to offer twice the moisture protection of cellophane. The film, introduced last week by Kordite Co. (Macedon, N.Y.), division of National Distillers and Chemical Corp., is currently undergoing extensive field testing in a variety of packaging applications. It's aimed at the $700-million/year packaging-materials market, is expected to sell for less than premium cellophanes. Development price is about 3.5¢/1,000 sq.in. in ½-mil thickness; estimated production price is about half that. Prospective users are now being supplied with developmental quantities from semicommercial production.

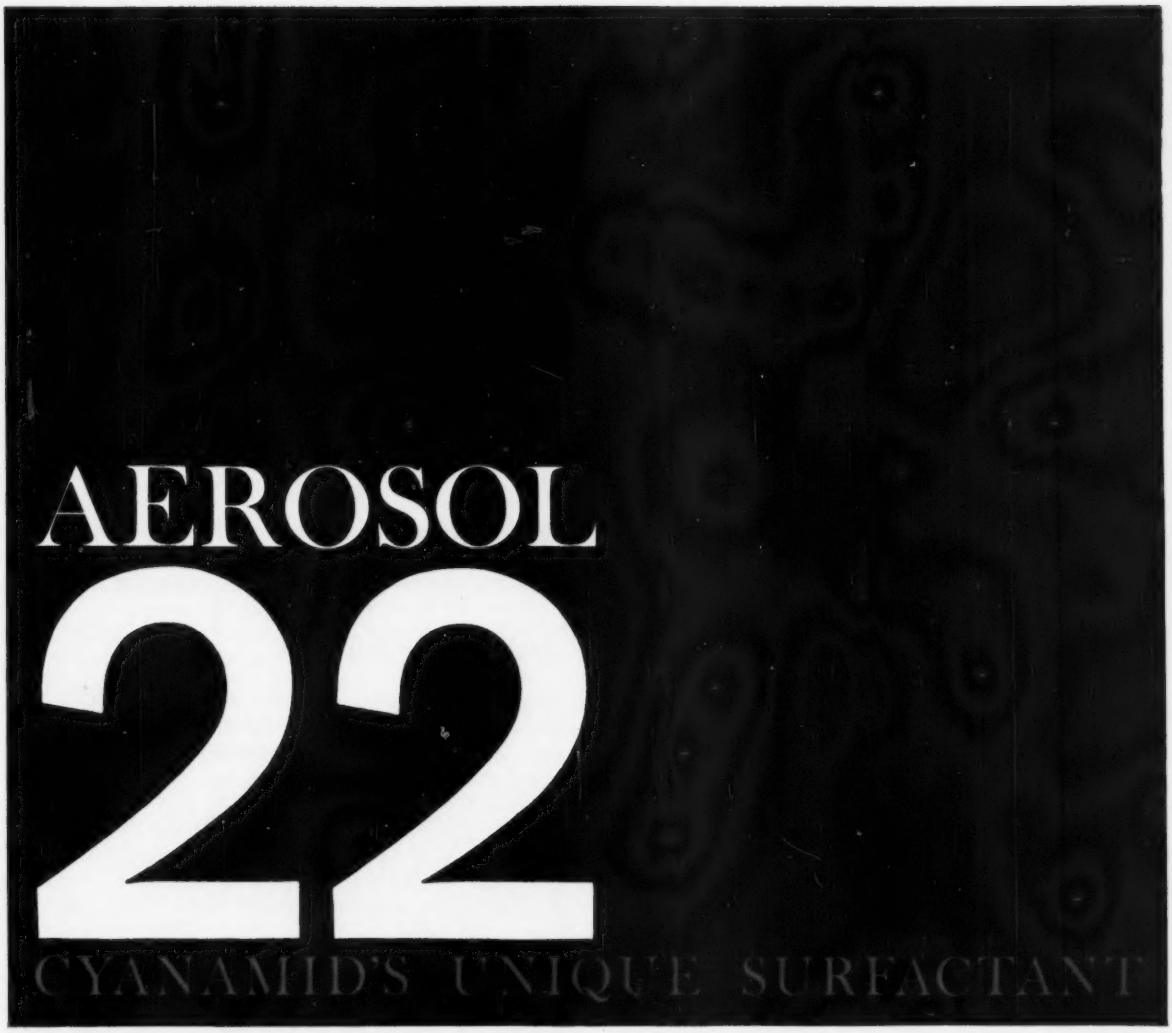
Chief difference between Kordite 1500 and another packaging film entry, Cryovac L., is in application. Cryovac L, produced by W. R. Grace & Co.'s Cryovac Division (*CW, March 26, p. 78*), is an irradiated, biaxially-stretched polyethylene packaging film. Its features: low cost (3¢/1,000 sq.in. in ½-mil thickness), oxygen permeability, shrinkability and clearness. Cryovac L can be processed on conventional machines, heat-sealed between 300 and 500 F, shrunk to the contours of the packaged item.

Kordite 1500, unlike other thermoplastic films, operates on most existing automatic cellophane packaging machines, is applicable for overwrapping consumer items requiring moisture protection. Other qualities claimed include high tensile strength (20,000-40,000 psi.), sparkle, clarity and stiffness, without low-temperature brittleness. Normal coverage of Kordite 1500 in ½-mil thickness is 50,000 sq.in./lb., compared with 20,000 sq.in./lb. for 1-mil-thick cellophane.

SELECTED PRICES CHANGES—WEEK ENDING APRIL 18, 1960

	Change	New Price
UP		
Bismuth nitrate, cryst., 250-lb. dms	$0.17	$2.25
Bismuth subcarbonate, USP, 150-lb. dms.	0.50	3.70
Bismuth subnitrate, NF, 200-lb. dms., f.o.b. wks.	0.50	3.15
DOWN		
Benzyl benzoate, USP, 50-lb. dms.	$0.02	$0.60
Manganese sulfate, frt. grade, 65% $MnSO_4$, bgs., c.l., dlvd. SE, ton	11.00	86.50
Tin, metal (Straits)	0.01	0.99

All prices per pound unless quantity is quoted.



CYANAMID

Noted for stability, Aerosol 22 is effective in polymerizing styrene and styrene-ethyl acrylate copolymers. It should also find use in the polymerization of ethyl acrylate, butyl acrylate and other acrylic esters and vinyl monomers. Other applications are numerous and varied—in emulsifying wax and oil emulsions—in demulsifying water-in-oil emulsions—defloculating certain pigments—dispersing in aqueous systems. For interesting technical data, send coupon today.

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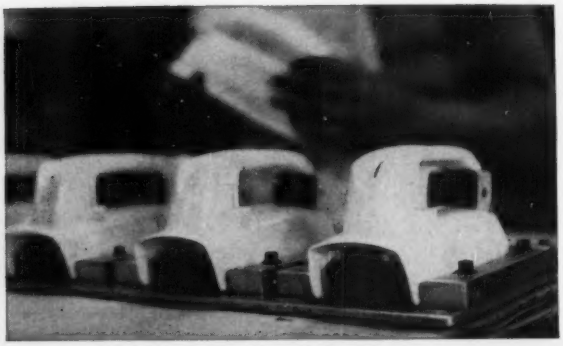


Chemicals from Armour for the plastics

Manufacturers of plastics and plastic products frequently are faced with production problems such as poor mold release, blocking, electro-static build-up on surfaces and inadequate dispersion of pigments. These problems and many others are being solved through the use of Armour Aliphatic Organic Chemicals. The cost and time-savings these versatile chemicals effect are worth the attention of every manufacturer of plastics and plastic products.

Mold Release and Anti-block Agents

When improper mold release of polyethylene occurs it necessitates costly and time-consuming operations. Two examples of 'extra' operations are, between-cycle release sprays and frequent cleaning of molds and extrusion dies. Poor anti-block properties lead to storage difficulties with stacked film and molded products.

Armour's Armid® chemicals (Aliphatic Amides) act effectively in solving these problems. The Armids migrate to the surface of the polymer film and act as slip or release agents during both extrusion and storage. In most cases only as little as 0.05% of chemical is necessary. Polyethylene films modified with an Armid chemical can easily be used in high-speed packaging operations. In addition, polyethylene molding equipment will cycle faster, less time is spent cleaning molds, and there is no need for between-cycle sprays. The anti-block properties are passed on to the finished products so there are no stacking or nesting problems while in storage.

Armids for plastic film for food packaging—Makers of plastic film for food packaging should be particularly interested in the use of Armid HT (Stearamide) and Armid O (Oleamide). Both of these Armour chemicals are listed as acceptable by the Food & Drug Administration for use in the food packaging field.

Anti-Static Agents

Vinyl—Electro-static build-up in vinyl products is a common and annoying problem. Production costs may be unnecessarily high because slip sheeting or other special handling during production and shipment is needed, and severe arcing may occur during calendering operations. In addition, the finished product will still retain the static charge, causing new problems for the user—unsightly dust collections on display items, annoying shocks built up on automobile seat covers.

Surface treatment of the plastic or vinyl has been used to prevent electro-static build-up, but this method of treatment introduces a new set of difficulties—limited protection time and water spotting (an extra operation if buffing is required after drying).

Search for a better method of eliminating static led Armour to investigate the incorporation of an internal anti-static agent. At present, Armour's Ethofat® C/25 and 60/15 and Ethoquad® C/12 are being incorporated into vinyl formulations. These polyethoxylated chemicals not only eliminate the production and shipping problems involved, but provide the anti-static property to the finished product.

Makers of pigmented plastics will be especially interested in recent work with Armour's aliphatic-organic coated pigments. When coated pigments are incorporated into polyvinyl chloride plastisols they impart internal anti-static properties to the fused sheet.

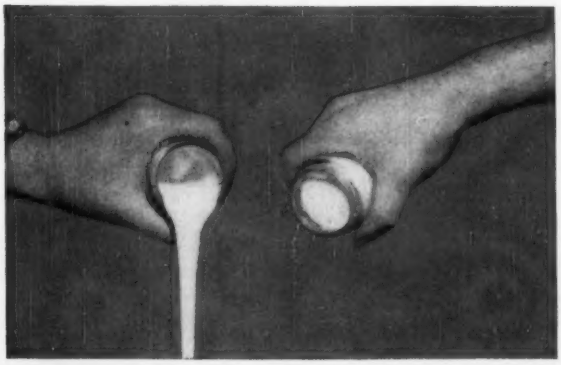
Fiber-glass—When producing resin fiber-glass structures, such as boats or chairs, a mixture of glass rovings and resin is sprayed onto a mold. As the rovings are delivered to the chopping head an electrostatic charge is developed that causes the rovings to migrate to the nearest source of an opposite charge, the metallic spray-gun.

industry

To overcome this problem, a water solution of Arquad® 12-50 (quaternary ammonium chloride) is used to coat the glass rovings, before they are used in the spray-gun. Work stoppages to clean clogged nozzles are cut sharply and it has been reported that there is an actual increase in the bonding strength of the resins to the glass.

Pigment Dispersants

Manufacturers of plastisols and other plastics that require pigments should take note of Armour's new combination of Arquad 2C and Ethomeen® S/12, a polyethoxylated amine. Latests reports indicate that the use of these chemicals for pigment dispersion can result in numerous advantages in production and finished product.



After several months aging, plastisols containing pigments coated with Armour chemicals (at left) remain fluid.

Using pigments coated with these chemicals, manufacturers can improve viscosity stability in plastisols, lower initial viscosity, maintain longer working periods for the plastisols, and reduce water and soapy-water extraction. Coatings of Arquad 2C and Ethomeen S/12 will also result in reduced processing time for inclusion of the pigment into the plastisol.

For additional information on all these Armour chemicals for the plastics industry, and for samples for your own testing, use the convenient coupon.

NEW DEVELOPMENTS FROM ARMOUR

Armid O

for polypropylene and low pressure polyethylene

Some of the most recent ideas in the plastics industry have come from manufacturers who are investigating new plastic materials.

Two such materials, that have come to light, are polypropylene and low pressure polyethylene. With the increasing use of these versatile materials, the need for certain formulation improvements has become apparent.

In keeping pace with these current developments, manufacturers examined the possibilities of using Armid O in the modification of polypropylene and low pressure polyethylene. Initial investigation has indicated that Armid O is effective in preventing blocking in these plastics, and imparts the same advantages that it does in polyethylene—improved extrusion and more easily handled products.

For additional information on Armid O for polypropylene and low pressure polyethylene, and for samples for your own testing, use the convenient coupon.

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Armour Industrial Chemical Company

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For complete information on the new Olin Mathieson propylene polyols—or helpful technical assistance, write to Olin Mathieson. 7284

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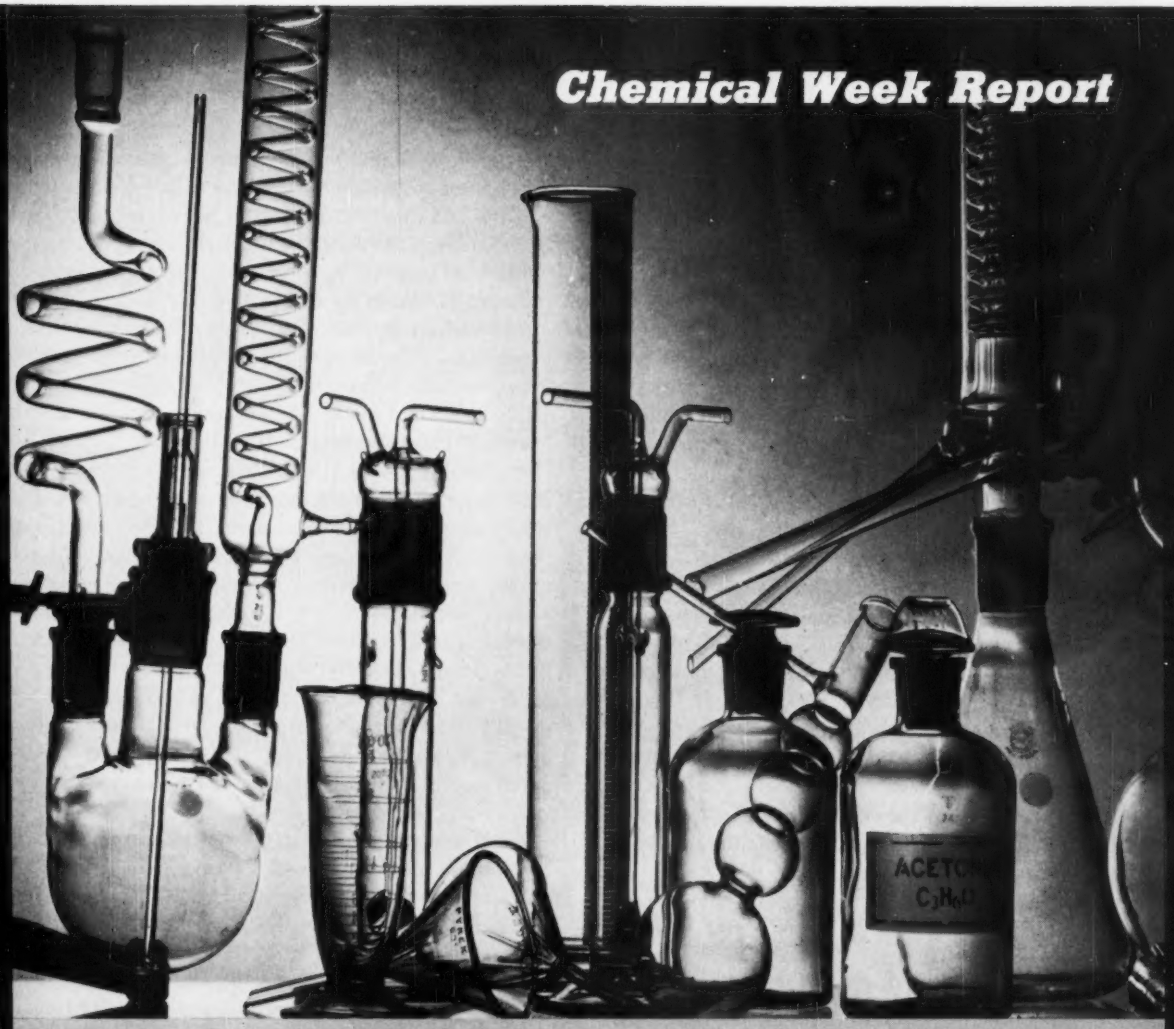


Glass—for headlamps, process piping, fibers, as well as lab ware—is largest single outlet for borax in U.S.

WHAT'S AHEAD FOR

Boron/Borax?

by Donald Taylor and Grover Collins

Producers are putting $3 million/year into research geared to double borax production in 10 years.

BORON BORAX

CW Report

Filled with confidence and willing to back it to the tune of more than $3 million/year, borax producers are pursuing an all-out research-development effort to unleash the potentials of boron chemistry. The industry has always courted research; and in the past few years, it has helped build sales to the $60-70-million/-year mark. Lately, expenditures of money and talent have taken a sharp turn upward, as the industry seeks to break into new, market-building fields.

Here's the proof: U.S. Borax & Chemical Corp., largest borax producer, alone is currently spending some $2 million/year on research. Its work is centered in a $1-million research center at Anaheim, Calif., completed in '57.

American Potash & Chemical Corp., also with new labs—research facilities completed at Whittier, Calif., in '53 were doubled in working space in '56—is currently spending for boron R&D some 40% of its estimated $2.5 million of annual research funds.

In addition, Stauffer Chemical, with laboratories at Chauncey, N.Y. and Richmond, Calif., is reportedly allotting a substantial part of its research budget —$4.7 million last year—to boron chemistry. And other firms in chemical and industrial fields are putting more and more stress on boron research.

Why this expanded interest in boron? Undoubtedly, the U.S. government's well-publicized high-energy fuels program was a major factor. However, this exotic fuels project has obscured what, in the long run, are believed to be much more important aspects of the research effort. Actually, substantial progress quite unrelated to high-energy fuels is being made in boron chemistry—progress that has prompted hopes that the industry's future will dwarf past accomplishments. Fact is, significant new products and applications from boron research are already boosting company earnings, and any major growth of boron producers will depend on discovery of big, new markets.

Recent Research Payoffs

One example of new products is Firebrake, a sodium-calcium compound, air- or ground-applied (with water) to "fireproof" timber in fire-threatened areas. It was developed by U.S. Borax in cooperation with the U.S. Forest Service, the California State Dept. of Forestry and the Los Angeles County Fire Dept. Since its introduction in '56, it has found increasing use in controlling brush, timber and forest fires, especially in hard-to-reach areas.

Borate-based herbicides are now finding wide use in the control of undesirable vegetation around military installations, railroads and industrial areas. These have the additional feature of imparting a substantial degree of fire retardancy to treated vegetation. Granular borate herbicides are one of the fastest-growing products in the borax industry today.

"Boron" gasoline additives represent another recent score for boron research. Developed by Standard Oil of Ohio and manufactured under license by U.S. Borax and Stauffer's Anderson Chemical Division, "boron" additive is featured by three major gasoline marketers in the U.S. Also in the automotive field, U.S. Borax has introduced an organosodium borate that's used in hydraulic brake fluids on many '60 car models to provide lower volatility and corrosion protection. Besides, borax products are now being used to manufacture borosilicate headlight glass and antifreeze solutions.

Multiple Payoffs: Boron research is paying off in other ways. On the nuclear power front, boron (the B^{10} isotope) is being used in a variety of ways for shielding purposes, since it's capable of absorbing neutrons without the emission of harmful secondary gamma radiation.

This shielding property was the main reason one of the first atomic submarines employed a boric acid ester for confining neutrons. Another new organic borate is now used in combination with paraffin for nuclear shielding, while elemental boron is incorporated into polyethylene and rubber for the same purpose. Ammonium pentaborate is being used in a "poison" (control) charge in atomic submarines.

Developments in other directions are similarly noteworthy. In '57, General Electric applied ultrahigh pressure to boron nitride, produced Borazon, a cubic modification harder than diamond. Stable to 3500 F (diamond oxidizes at 1600 F), Borazon should find new and advanced usage in industrial tools.

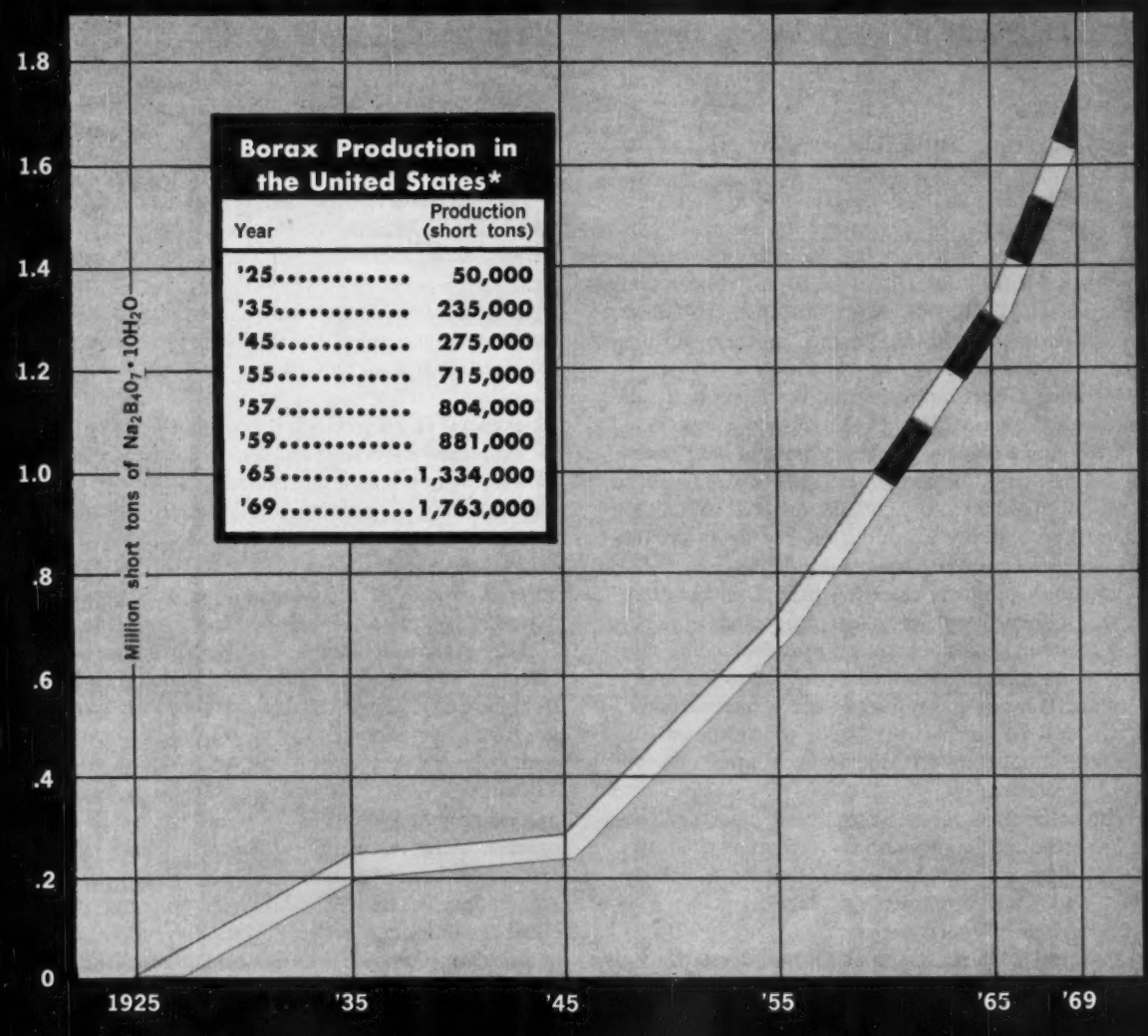
Various metallic borides are promising in high-temperature coatings for applications requiring resistance to wear and corrosion—e.g., for coating rocket engines in areas exposed to high temperatures.

High-purity elemental boron is proving interesting as a crystalline semiconductor material. In this role, other materials are limited to temperatures of about 100 C (germanium) and about 300 C (silicon). Boron is expected to fill the need for a semiconductor material that will function at still higher temperatures.

First BF_3, Now BCl_3: Boron research is paying off in other ways, too. The numerous well-known catalytic uses for boron compounds (largely of boron trifluoride) have recently been augmented by a partner, boron trichloride.

Besides its uses as a catalyst, boron trichloride is the starting material for a variety of boron alkyds, boron nitrogen-organics and boron polymers, all of which are in the early phases of research by borax producers as well as other chemical industry contenders. Stauffer's Niagara Falls, N.Y., plant that produces this important halide was expanded substantially in '58.

Borax Production Goal: 1.8 Million Tons by '69



Borax Production in the United States*

Year	Production (short tons)
'25	50,000
'35	235,000
'45	275,000
'55	715,000
'57	804,000
'59	881,000
'65	1,334,000
'69	1,763,000

*1925-57 production from U.S. Bureau of Mines; 1965 and '69, CW estimates.

While Stauffer leads the industry in boron trichloride production, American Potash also produces it in commercial quantities, particularly for the electronics industry. And American Potash was the first to offer boron tribromide in commercial quantities, continues to supply this material.

In '58, U.S. Borax and Dow Chemical entered into a joint venture to perfect economical methods of manufacturing boron trichloride. The pilot-plant project, conducted at Freeport, Tex., was successfully completed recently, but there has been no move yet to commercialize its discoveries.

Boron's Promising Polymers: Although the boron-fuels-for-aircraft project was terminated recently, the Navy and Air Force are still interested in boron-based rocket propellants. Since July '58, for example, the Air Force has had U.S. Borax under a substantial contract to investigate thermally stable inorganic polymers.

It seems a natural role for boron, because its compounds may be able to withstand the high temperatures (500-1000 F) demanded in many rocket devices—temperatures that best-to-now organic polymers, such as silicones, can't take. Research now centers around a variety of boron-boron, boron-nitrogen and boron-oxygen backbone polymers. Polymers stable in the 500+ F range have been made; better ones are sought.

But boron polymers have a long way to go. Major problem: finding an economical way to make the compounds. Spokesmen for the industry, however, have claimed considerable progress in reports to the Air Force and in discussions at technical meetings.

Stauffer has high hopes for organometallic com-

pounds containing boron. The company believes that low-cost boron hydrides, developed in part for the high-energy-fuels program, will lead to important civilian uses. The quantities of high-energy boron missile and rocket fuels may prove sizable. Stauffer maintains its interest in this field through Stauffer-Aerojet operations at Sacramento, Calif. U.S. Borax and American Potash, through participation in AFN, Inc., are also pursuing research in this area.

Rounding Out: Completing the boron research and development picture, U.S. Borax reports it is working on a dry home-laundry bleach formulated with boron. For the first time, the company claims, a way has been found to produce a dry, stable material containing sodium hypochlorite. Boron is the key to its production, but precise details are not forthcoming.

Other new products emerging from U.S. Borax research: sodium hexylene glycol monoborate, a new alkaline sodium-organoborate for uses demanding solubility in nonpolar organic media (e.g., corrosion inhibition in certain oils and solvents); and a combination of borates and trichlorobenzoic acid, which shows considerable promise as a herbicide for control of deep-rooted perennials.

Firms other than the basic producers have made important research contributions to boron chemistry. Among them are Olin Mathieson, Callery, Metal Hydrides and Stauffer-Aerojet, all playing notable roles in the high-energy-fuels program.

In addition, Norton Co. and Carborundum Co. are well recognized for their boron carbide and boron nitride work. In metallic borides, Cooper Metallurgical Associates, Borolite Corp., Norton and Carborundum have achieved important pioneering results. General Chemical and Harshaw Chemical have done extensive work in the market development of boron trifluoride and other fluoroborates.

Resources Behind Research

The number of firms participating in boron research is steadily increasing. And with each new entry into the field, prospects heighten for development of a whole new array of boron compounds. So far, of course, few of the new developments have clicked in a spectacular way. But the new items have steadily added to boron sales. This question arises: How well is the industry prepared, supplywise, for a market breakthrough?

The most extensive supplies of borax exist in California. Without such lavish resources, the future for domestic producers of boron compounds would look less promising.

Probably the world's largest and richest deposit is owned by U.S. Borax & Chemical at Boron, Calif. It consists of massive beds of tincal ($Na_2B_4O_7 \cdot 10H_2O$) and kernite ($Na_2B_4O_7 \cdot 4H_2O$); other saline minerals are absent entirely or present in only trace amounts.

James Gerstley, U.S. Borax president, says that, based on the present consumption rate and projected growth, USB reserves are enough to last at least 100 years.

In refining, crushed ore is run through dissolvers at elevated temperatures; the soluble borax goes into water solution, and insoluble gangue is later removed by screening, settling and filtering. The settling tanks (thickeners) employed in this operation are claimed to be the largest covered thickeners in the world. Refined borax results when concentrated solutions pass from the thickeners to vacuum crystallizers, where 10-mol (borax decahydrate, $Na_2B_4O_7 \cdot 10_2O$) and 5-mol borax (borax pentahydrate, $Na_2B_4O_7 \cdot 5H_2O$) are recovered. Water of crystallization is subsequently removed in rotary calciners to produce anhydrous borax.

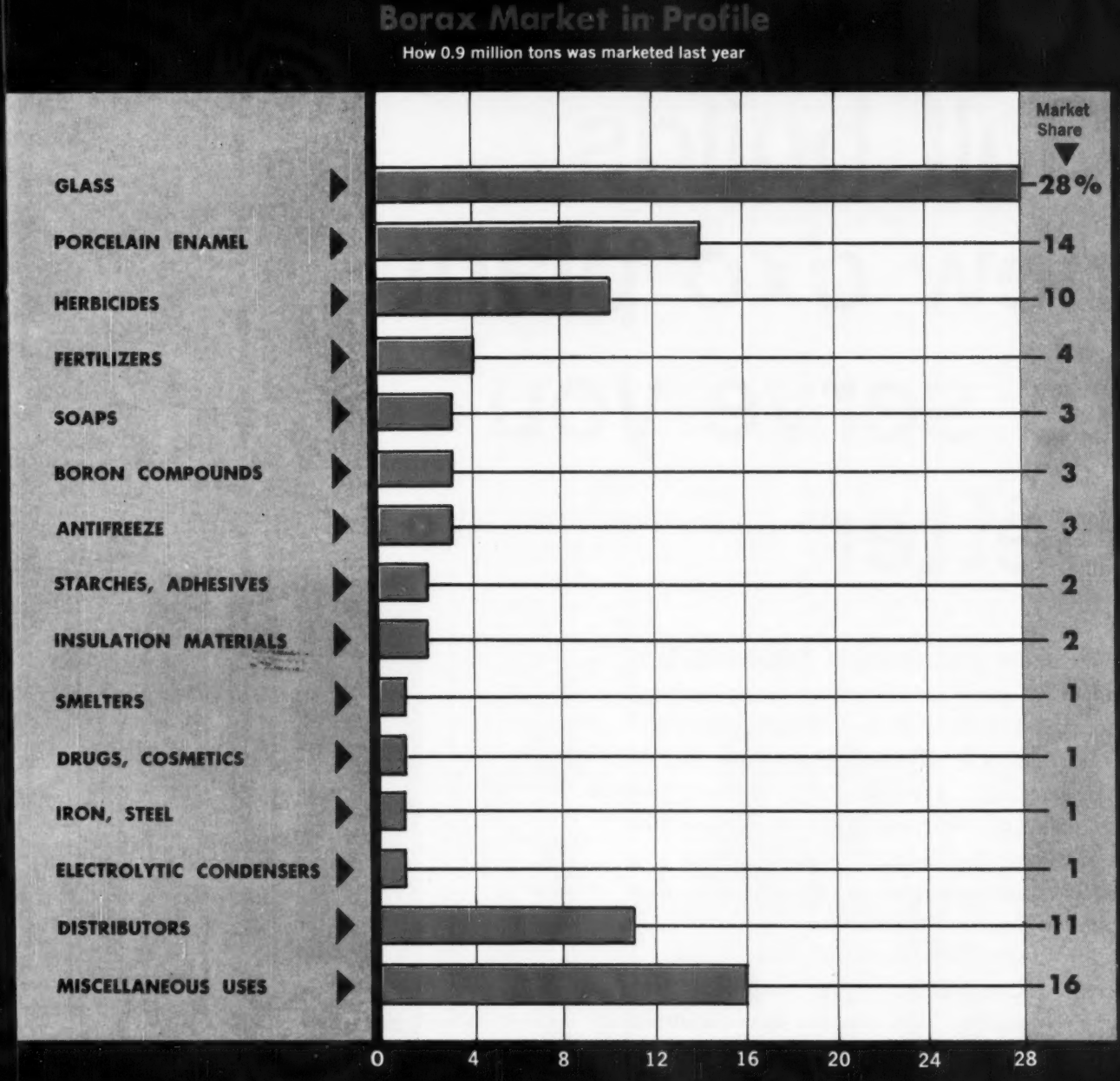
Both American Potash & Chemical and Stauffer Chemical's West End Division obtain their borax from Searles Lake by fractional crystallization. This integrated operation produces a variety of commercial chemicals.

Stauffer's West End Division, the largest soda ash producer on the West Coast, utilizes a brine carbonation process. After removing sodium carbonate, Stauffer crystallizes borax from the residual liquor by cooling. After borax is removed, additional cooling crystallizes Glauber salt for conversion into sodium sulfate.

American Potash's process for treating the lower brine is essentially the same as West End's: the upper brine is handled in different fashion. It's concentrated in triple-effect evaporators to remove various nonborate salts and leave borax and potassium chloride in hot solution. On cooling, potassium chloride crystallizes from solution and is recovered. The final liquor, stripped of potash and other nonborate salts, is seeded with crystals of sodium tetraborate pentahydrate ($Na_2B_4O_7 \cdot 5H_2O$), and agitated to yield the desired borax decahydrate.

Estimates of the borax content of the upper crystal body of Searles Lake are figured at 48 million tons. (A brine lake such as Searles has several distinct salt concentrations at various depths—or crystal levels.) There is little information available on reserves in the lower crystal body.

In addition to sodium borate deposits, Stauffer and U.S. Borax both have reserves of calcium borate ore (Colemanite—$CaO \cdot 3B_2O_3 \cdot 5H_2O$). Besides, U.S. Borax holds reserves of Ulexite ($Na_2O \cdot 2CaO \cdot 5B_2O_3 \cdot 16H_2O$) and of sodium calcium borate (Gerstley borate), a mixture of Colemanite and Ulexite. Colemanite, sparingly soluble in water, is now sold as an unrefined material.



In sum, the borax industry is confident that borax resources are abundant enough to meet whatever research, production and market demands are made upon them for a long time to come.

Million-Ton Market

Borax consumption has doubled every 10 years over the past 30 years. Production in '59 is estimated at close to 1 million tons. If the past rate of growth were reasonably applied to the future, demand in 10 years would approach 2 million tons *(see graph, p. 97)*.

Here's the borax end-use pattern: glass, 28%; porcelain enamel, 14%; weed control chemicals, 10%; fertilizers, 4%; soaps, boron compounds, antifreeze, 3% apiece; adhesives, insulation materials, 2% apiece; drugs and cosmetics, smelters, iron and steel uses, and electrolytic condensers, 1% apiece. Distributors take 11% of the market, miscellaneous users, 16%.

Key Market Ceramics: As shown, the major portion of the 1 million tons/year of borax is consumed by the ceramic industries. Borax is essential to the manufacture of high-temperature-resistant glass; it lends the low coefficient of expansion required.

Important in this group are items such as sealed-

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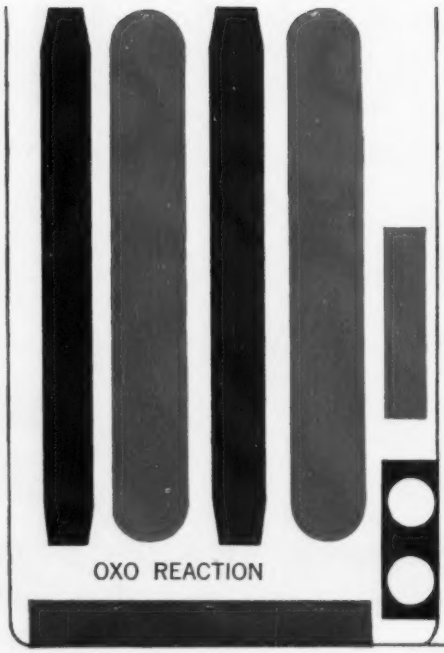

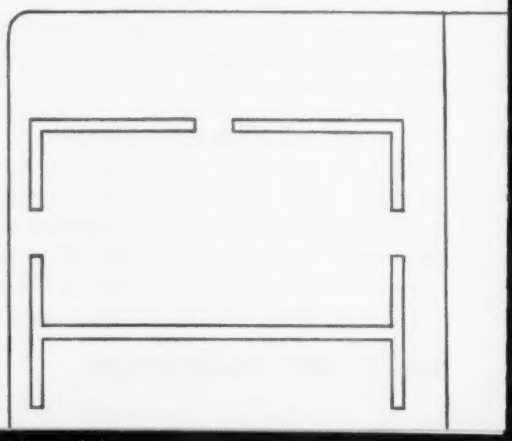

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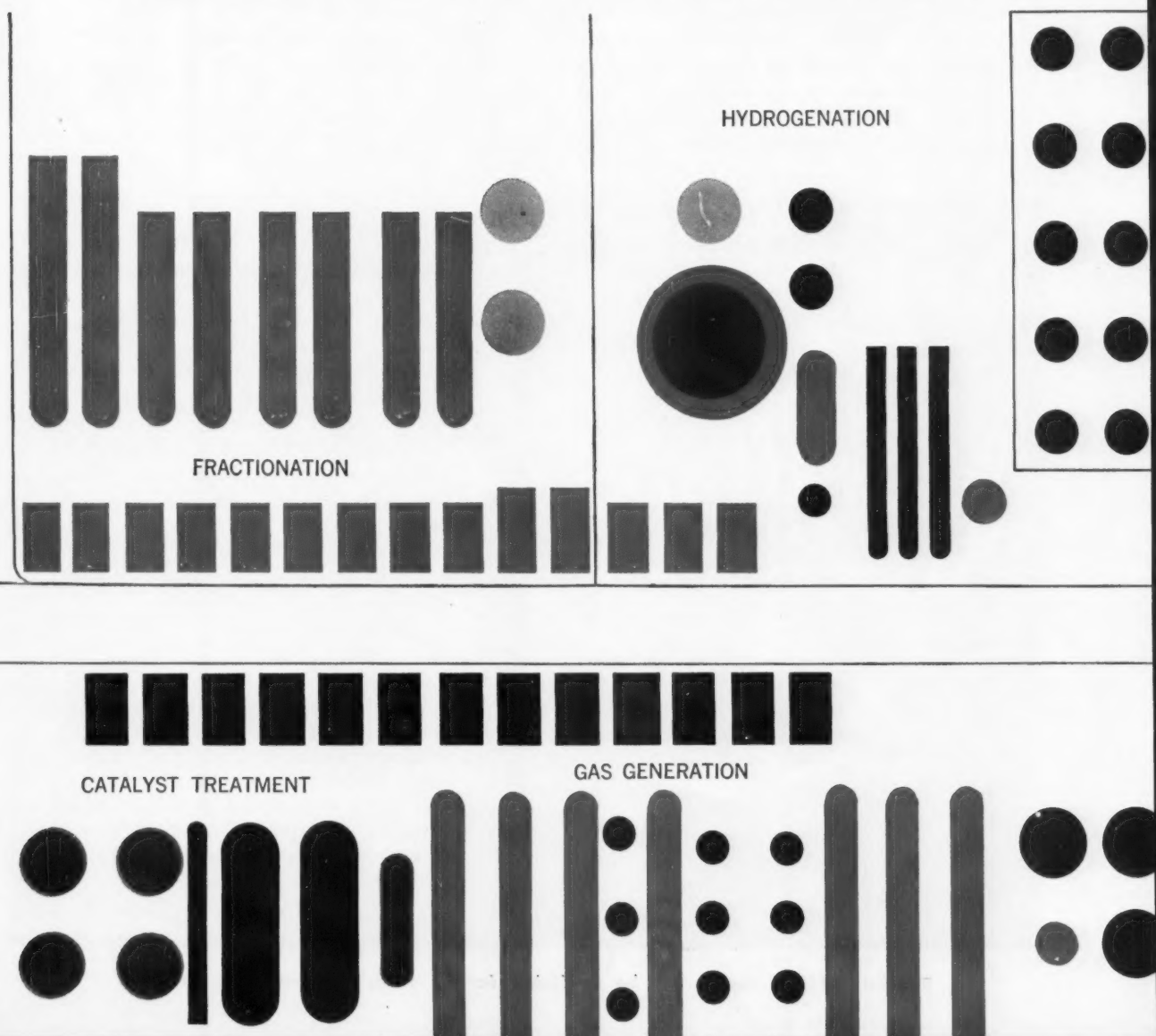

beam headlights, laboratory and industrial glassware, cooking utensils and the growing glass-fibers market.

Expanding glass-fiber uses in insulation, textiles and reinforced plastics applications have prompted several substantial glass plant enlargements during the past year. Further expansions are coming up.

Optical glass is another prime outlet for borax, where it is useful in controlling refractive index, melting, fining and forming operations. The same properties are behind borax's use in manufacture of containers, structural glass, flat glass and novelty glass. Borax also enhances such properties as color, durability, scratch resistance and strength of the finished ware.

Thousands of tons of borax go annually into the manufacture of porcelain enamel, where the same property advantages are generally sought as in the glassware field. Up-and-coming application of porcelain enamel: architectural products. Increasing quantities of architectural porcelain are going into construction of commercial buildings, gasoline stations, store fronts, and even some "houses of the future."

The rising demand for household appliances and new automobiles will likely bring a corresponding increase in demand for borax and boric acid. Widespread acceptance of borosilicate headlights by the automotive industry, coupled with generally optimistic auto sales predictions for next year indicate increased demand for borates.

Export Prospects Excellent: Also to be viewed in the total borax picture is the sizable and growing foreign market for borax. The U.S. is in the favored position of being principal supplier of boron products to non-Communist nations.

Outlets generally parallel those in the U.S. There has been a significant upsurge in demand for borates by Europe's glass, porcelain and chemical industries. Indications are, too, that demand for glass fiber in Europe is growing; and in Australia, demand for herbicides and timber-treating products is due for a rise.

Boron Outlook Bright

With a steadily widening market both at home and abroad, with hopes running high for success from increasing research efforts, the borax industry confronts the future with optimism. There are good grounds for believing that its greatest growth still lies ahead.

MEET THE AUTHORS

Donald Taylor (right), senior author of this CHEMICAL WEEK report, is vice-president of U.S. Borax & Chemical's technical department and president of the company's subsidiary, U. S. Borax Research Corp. During his 15 years at USB he has worked primarily in the borates and boron compound field. Prior to that, he was with Du Pont in El Monte, Calif., and with Shell Development Corp. in Emeryville, Calif. He holds a Ph.D. in chemistry from the California Institute of Technology.

Grover Collins (left), manager of U.S. Borax Research Corp.'s new-product development, has been with the company since '46. Following graduation from the University of Alabama with a B.S. in chemical engineering, Collins went directly into the Navy and joined USB soon after his discharge.

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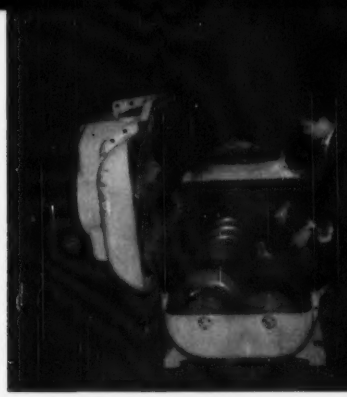

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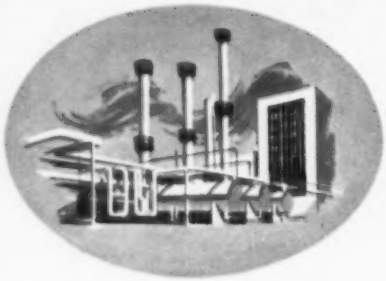

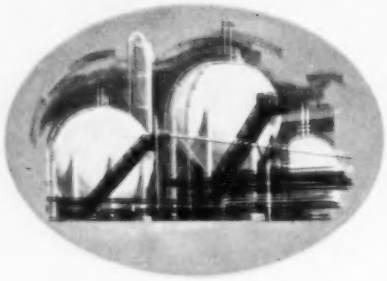

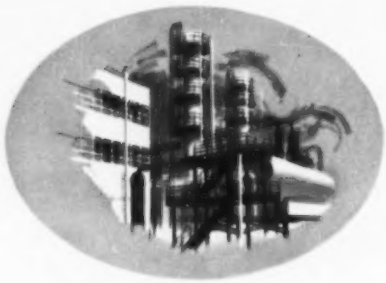

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School for tomorrow: Model of plastic school to be built by Massachusetts Institute of Technology.

Plastic Buildings Fight a Language Barrier

Does the key to development of the obviously enormous — but still largely untapped — market for plastics in building construction lie in communication, in getting builders and plastics makers to talk the same language? An increasing number of manufacturers feel it does, so this year something is being done about it and their efforts to find a common tongue may advance the plastics-in-building boom by years.

Already, some significant steps have been taken. Example: an information advisory panel—set up by the Plastics Study Group of the Building Research Institute—has studied the problem of communicating vital information to architects and contractors.

Fruit of its first job—aired at a recent meeting of BRI at New York City—is a proposal for a standardized way of giving to architects and builders pertinent data on plastics that may be used in construction.

In the proposal, now being evaluated, all building materials that contain plastic in some form would be described in relation to seven major descriptive sections subdivided in detail:

(1) Product description (tradename, manufacturer, type of material, plastic used, use of product).

(2) Physical properties (strength, dimensional stability, light and thermal resistance, aging, toxicity, etc.).

(3) Design criteria (size, thickness, weight, workability, adhesion and cohesion, etc.).

(4) Installation (surface preparations, methods of attachment, equipment required, etc.).

(5) Maintenance (preventive inspection, repairing, replacement, soiling, cleaning).

(6) Economics (material cost, installation cost, insurance cost, maintenance cost).

(7) Case histories (appearance, total costs, installation and check dates, etc.).

BRI says a major object of the format is to provide technical data that is free of the boasting that advertising often contains. The next step for BRI is to find an organization — either CPI or architectural —that will take over the format and put it into practice. Such plans, however, apparently have not yet begun to gel.

The observation that existing data isn't always dependable — from the users' point of view — was substantiated in part by Walter Gloor of Hercules Powder, who told the BRI audience that "strength data put out by many of the chemical companies . . . [for plastic pipe] . . . apply possibly to laboratory or shop molded specimens and . . . not necessarily . . . to properties of the pipe which may be made under somewhat different conditions."

Gloor also pointed out that different plastic pipe manufacturers can take the same raw material and come up with pipes that differ in many respects.

Builders are troubled not only by the resulting product variations, but also by the variety of products placed

Resin types used in construction
(million pounds, 1958)

	Total produced	Used in construction	Percent used in construction
Acrylic	121	12	10
Melamine and urea	324	66	20
Phenolic	461	155	34
Polyester	114	19	17
Polyethylene	864	110	13
Styrene	695	140	20
Vinyl	821	207	25
Total	3,400	709	21

Plastics in construction by resin types
(million pounds, 1958)

	Plywood Bonding	High-pressure laminates	Hardboard	Insulation	Wiring devices	Panels	Pipe	Plumbing fixtures	Wire coating	Wall tile, coverings	Flooring	Paints	Lighting	Pounds resin	Percent of plastics used in construction
Acrylic												✓	✓	12	2
Melamine and urea	✓	✓												66	9
Phenolic	✓	✓	✓	✓	✓									155	22
Polyester						✓	✓	✓						19	3
Polyethylene				✓			✓		✓					110	15
Styrene				✓						✓		✓	✓	140	20
Vinyl							✓		✓	✓	✓		✓	207	29

Plastics end-uses in construction
(million pounds, 1958)

Structural panels	17
Plywood and hardboard bonding	84
Wire coating	125
Wiring devices and electrical controls	44
High-pressure laminates	33
Wall tile covering	49
Bath and plumbing fixtures	12
Flooring	112
Moisture barrier and insulation	79
Piping	27
Lighting fixtures	12
Total	594

under one category of product type. Broadness of categories makes it difficult to compile meaningful data. In fact one complaint centers on the definition of what a plastic floor is; not all manufacturers appear to realize that, although by nature all resilient floors are plastic, not every resilient floor material should be classified as a plastic.

With some products, there are shelf life or installation problems, and BRI believes that letting architects and builders discover these problems on the construction site 'sn't the way to push growth of plastics in building applications. Realistic and honest data — readily available and understandable — is obviously the best key to proper market development.

Code Confusion: Continuing obstacle in development of plastic markets in building applications is required conformity with building codes. Some times it is simpler to alter present codes to encompass new plastic materials, rather than make plastics meet standards of other materials.

Industry attitude on this, as expressed at a meeting at the National Housing Center, Washington, D.C.: plastics will gain acceptance faster through local adoption of uniform codes that are periodically and frequently revised to keep them up to date.

But code revisions don't solve all problems. Two building officials say their codes have plastics sections but that acceptance of products such as plastic pipe is handicapped because the plastics industry has no ASA or ASTM industry standards. The Building Officials Conference of America and the Southern Building Codes Congress do accept new products on the basis of laboratory tests supplied by manufacturers. But this procedure is slower and more complicated than it would be if the industry had uniform qualifying standards.

Lessons from Japan? The U.S. building industry — from primary plastics producer down the line to building contractors — may well profit from Japan's experiment in building of plastic houses.

Japanese house builders are definitely interested in putting up all-plastic structures. Right now, for example, Sekisui Chemical Industry in Osaka is launching production of plastic houses priced at about

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221 Low Titer White Elaine	5.0/0.5	20.0/7.0	15.0/5.0
EMERSOL STEARIC ACIDS			
132 Lily (T.P.)	1.0/0.3	4.0/1.8	2.0/1.3
120 (D.P.)	1.5/0.5	7.0/2.0	4.5/1.5
140 Palmitic	1.0/0.3	6.0/2.0	3.0/1.5
150 High Stearic	1.0/0.3	6.0/2.0	3.0/1.5

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The houses are made mainly of polyvinyl chloride, polystyrene, polyester; reinforcement is with aluminum, light steel beams, pipes.

Admittedly, Japanese construction codes bear little relation to those in the U.S., and the houses do not compare with U.S. residences in size and cost. Nonetheless, Japanese houses will be subject to normal wear, and the tough weathering of the Japanese climate. How they stand up should be of considerable interest to the U.S. building industry.

Initial Impact in the North? There's some indication that one big U.S. plastics market — that for plastic sandwich insulating panels — will open up in northern U.S. Key reason: the panels' high insulating value as well as their ease of assembly makes them more attractive in colder regions. Only after they gain acceptance in the East and Midwest will builders in the South and other warmer areas become more interested. That, generally, is the reasoning of Nels Severin, president of Dycor Products in southern California, whose firm has decided not to exercise its option (from Koppers) to make the panels.

Dycor's decision to hold off doesn't indicate lack of faith in the potential growth of the market. Severin agrees with estimates that within five years 20% of U.S. houses then under construction will be fabricated with plastic panel walls and ceiling.

How Big Now? A CHEMICAL WEEK check of leading plastics-in-construction experts reveals a dearth of up-to-the-minute information about end-uses of various plastics by the building industry. Latest breakdown — which may reasonably well reflect the current order of magnitude — is a '58 market study put together last year by Monsanto's market research department (*see tables, p. 106*).

Forecasts of plastics consumption are difficult to make. Moreover, to assume that the current ratio of plastics to other building materials used will hold for the next few years, and that plastics use will grow at new-house-building rates, is hard to justify. Most plastics makers think building use will be magnified many

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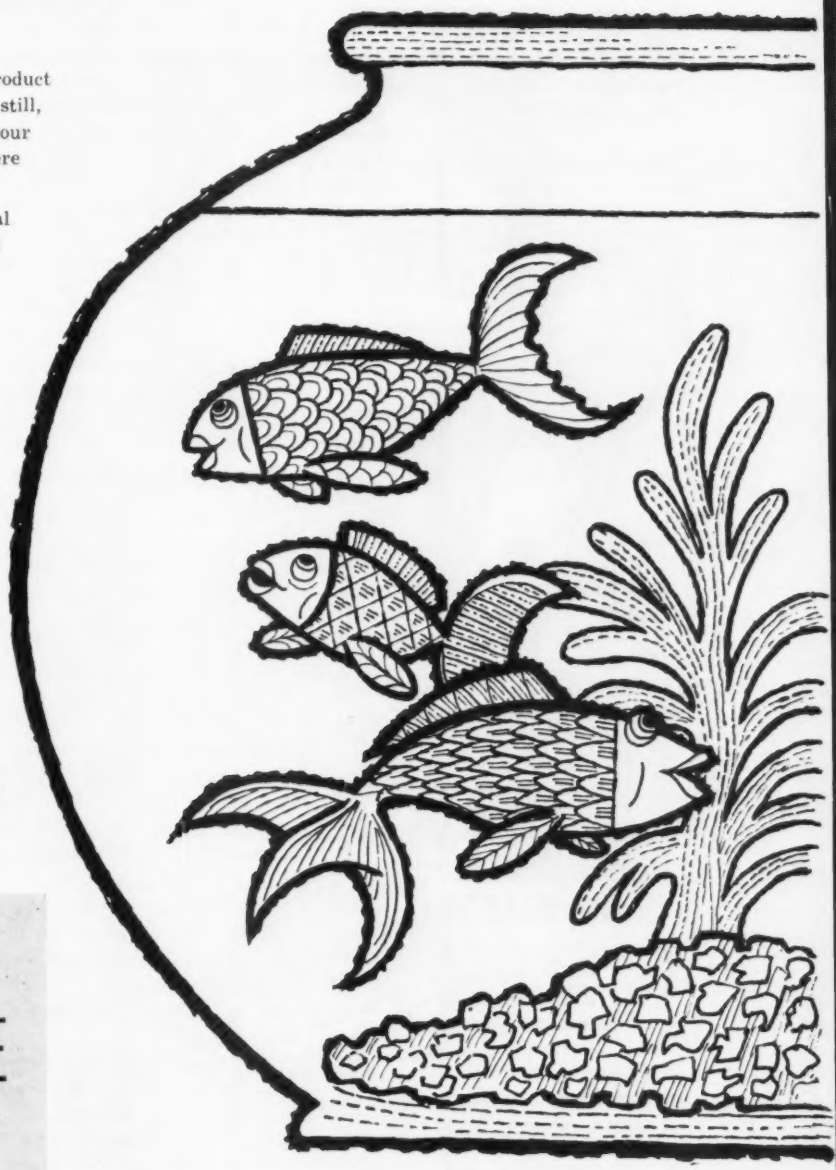

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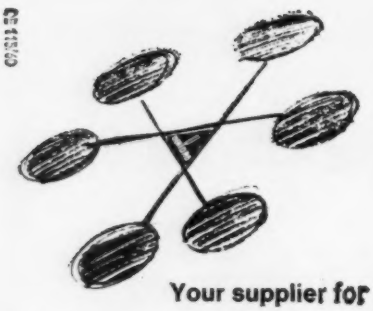

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times if the present attempt to coordinate activities of producers and users of plastic materials works out.

Certainly, many industry groups are working to that end. The Building Research Institute's November meeting allots a prominent spot to plastics. And other organizations are also emphasizing plastics-in-building. Next month, the Chemical Market Research Assn. plans a New York program designed to interest architects, builders, decorators, city planning officials as well as chemical market researchers. And the Society of the Plastics Industry will include this topic at its Miami, Fla., meeting.

Meanwhile, other organizations are attacking the problem in other ways; Southwest Research Institute in San Antonio, Tex., is studying fire regulations with reference to plastics (sponsored by the Manufacturing Chemists' Assn.)—a final report should be ready this summer. In the East, MIT is preparing to construct a prototype school building made of plastics (*see picture, p. 105*).

Clearly the push is on, and there's a very good chance that the plastics industry will tap its building market bonanza before the decade is out.

Prediction Parade

The second quarter of '60 started off with a rash of industry predictions of great things to come; here are some samplings of spring-bright forecasts for the film and foil markets (*see also CW, April 16, p. 116*).

- Demand for aluminum foil will increase 65% by '70, says R. P. Jensen, sales manager for Kaiser Aluminum & Chemical. Indications are that foil shipments will be about 337 million lbs. by '65, 411 million lbs. by '70. Previous records: 84 million lbs. in '47, 100 million in '50, 198 million in '55, and 252 million in '59.
- Cellophane use will grow 40% in the next decade, according to Robert Smith, sales director of Du Pont's Film Dept. Increase will be from 436 million lbs./year now, to some 600 million lbs./year by '70.
- New overwrap machines will help push polyethylene film sales—for packaging uses—over the 300 million lbs./year mark in '60, a 20% increase over '59, predicts T. W. Sharp, Union Carbide Plastics' director of product marketing.

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New antifreeze pitch: water, not ice, the target.

All-Year 'Sell' for Antifreeze

Two U.S. antifreeze makers are seeking to convert their product from a seasonal into a year-round seller. The pitch: switch emphasis away from freeze protection—a one-season, regional problem—concentrate it on corrosion—a year-round, nationwide factor. That seems to be the strategy behind the recent off-season introduction of Dow's Dowgard and Du Pont's Telar.

Both products play down the antifreeze angle: Dowgard is promoted as "a year-round cooling system fluid"; Telar is labeled as a "never-drain antifreeze and antirust coolant."

Dow's is the more drastic departure from traditional antifreeze marketing. Whereas the Du Pont product (like a standard antifreeze) is mixed with water by the user, Dowgard requires no dilution. Not only does this assure Dow a higher return per customer ($12 worth of Dowgard is supposed to protect the average car), but it also discourages the use of competitive products as replacement fluids.

The big sales feature for Dowgard (which sells for $2.29/gallon) is the use of deionized water. Deionized water, say Dow's ads, defeats the radiator's worst enemy—natural water—"which attacks metal, causes rust, corrosion and clogging."

Dow thus steals the march on many of the existing antifreeze makers by extending the markets for the product to warm-weather areas ordinarily thought to be outside the orbit of antifreeze promotion.

Du Pont's $5/gal. Telar also deemphasizes the seasonal aspect of antifreeze. The potential buyer is wooed with the idea of a coolant good for the life of the car. Unlike the Dow product, Du Pont's calls for the addition of water. Thus, whereas Dow will be aiming at $8-12/customer, Du Pont will garner about half that figure. Also, while Dow is aiming at complete replacement of Dowgard after a year in the radiator, Du Pont will apparently be content to sell makeup quantities (to replace losses).

A color indicator—which changes from red to yellow—built into the product tells the motorist when he needs to replenish the solution.

A check with some other major marketers of antifreeze (e.g., Union Carbide and Commercial Solvents) indicates that there won't be any great rush to follow the lead of Du Pont and Dow. Most marketers have not settled on competitive steps.

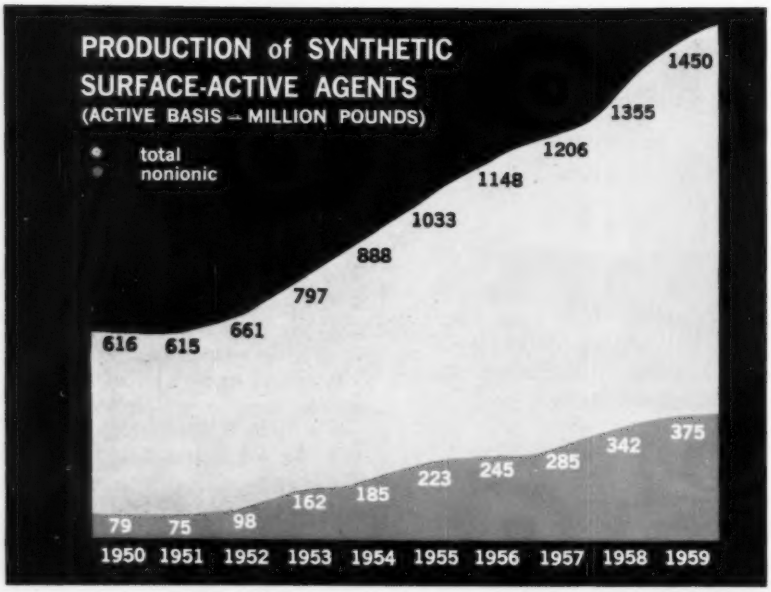
A few expressed skepticism about the probable success of either Dow or Du Pont in selling the public on the idea of a year-round coolant fluid—particularly after the industry has spent millions of dollars trying to educate the public that "permanent" is a misnomer as far as antifreeze is concerned. Re-educating the public may be a hard, and expensive, proposition.

Du Pont will spend more on Telar promotion this year than it will spend on any of its other consumer products. Present promotion budget for Dowgard is thought to be around $6 million annually.

Certainly none of the major antifreeze makers will knock the year-round concept. Antifreeze makers, faced with a fairly steady market of about $300 million/year, have been fighting each other for a bigger slice.

A check of the three major U.S. auto makers elicited little enthusiasm for the new products.

If the moves by Du Pont and Dow can make the U.S. public coolant-conscious, the result should be a leveling-out and general uplift of antifreeze sales. (About 60% of U.S. antifreeze is sold in October and November, 40% in December and January.) Success of these new products will provide a little sunshine for an industry that has heretofore been locked in winter's icy grip.



Nonionics are steadily increasing their share of the total synthetic surfactant output, now account for better than 25% of the over-all production. Growth of liquid detergents in the household and industrial fields, coupled with decreasing cost, should up production from the present 375 million lbs./year to around 520 million in the next five years.

Nonionics '65 Target: 500 Million Lbs./Year

Nonionic detergents, spurred by the growth of such specialty items as low-foaming liquid household cleaners, are enjoying a boom.

From a total production figure of 79 million lbs. in '50 (12.8% of the total U.S. surfactant production) the nonionic group of surfactants has climbed to around 375 million lbs. (25.9% of over-all surfactant output). And they'll climb farther in the future; by '65 around 520 million lbs. of nonionics should be turned out yearly in the U.S.

This optimistic outlook was voiced by Joseph Goerner, manager of specialty products, Jefferson Chemical Co. (Houston, Tex.), before last week's meeting of the Division of Chemical Marketing & Economics of the American Chemical Society in Cleveland. Here's a breakdown of some of the trends Goerner pointed out for the group:

More Rapid Rate: While over-all production of all synthetics more than doubled in the '50-'59 period (from 616 to 1,450 million lbs.) the nonionics increased almost five times—or at twice the over-all rate. The spurt in nonionics is due to public acceptance of low sudsing—a characteristic that had previously held nonionics back. Also contributing to growth: increased use in industrial products; almost 50% of nonionics production is for industrial use compared with around 25% for all surface-active agents.

Four Frontrunners: Though there are many classes of specialty nonionics, four classes accounted for about 76% of the total in '59—alkanolamides (100 million lbs.), alkylphenol-ethylene oxide adducts (90 million lbs.), tall oil-ethylene oxide adducts (50 million lbs.) and fatty alcohol-ethylene oxide adducts (45 million lbs.). The remaining 90 million lbs. were made up of such items as glycerine and glycol esters — e.g., glycerol monosterate, ethoxylated sorbitol fatty esters and ethylene oxide-propylene oxide polymers of the Pluronic type, a number of petroleum demulsifiers based on ethylene oxide and/or propylene oxide as well as the ethoxylated tertiary dodecyl mercaptans and lanolin-ethylene oxide adducts and a number of others.

Alkanolamides: The 100-million-lbs. figure for alkanolamides includes products made from the reaction of an alkanolamide with a fatty acid to produce a complex mixture of amides, esters and free amine. It also includes the "super amides" or essentially pure alkanolamides produced by the catalyzed reaction between an alkanolamine and the methyl ester of a fatty acid. The amides produced from lauric acid (or an ester thereof) and diethanolamine are the most widely used, with amides produced from monoethanolamine and monoisopropanolamine next, in that order.

Better than 75% of the alkanolamides are currently being used in solid, heavy-duty washing powders (as foam boosters and secondary detergents) and in light-duty detergents (as thickeners, foam stabilizers and secondary detergents). The rest go into industrial applications like textiles and metal cleaning. The monoethanolamides and isopropanolamides are used primarily in solid formulations; the diethanolamides primarily in light- and heavy-duty liquid and general-purpose liquid cleaners (which have increased from 2% to 17.5% of the total detergent production from '50 to '59).

Most of these amides are tied to coconut fatty acids, though it's thought that synthetic acids derived from the Alfol-type alcohols — if they're priced low enough—might someday have application here (*CW, Feb. 6, p. 36*).

Alkylphenol-Ethylene Oxide Adducts: Currently the second-largest class of nonionic surfactants are alkylphenol-ethylene oxide adducts produced by adding ethylene oxide

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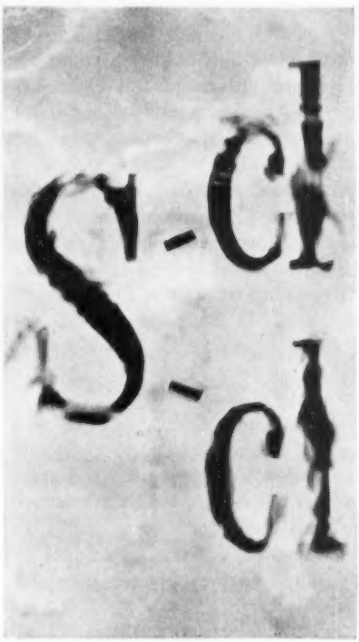

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to an alkylphenol. Used commercially since about '47, their production of around 90 million lbs. accounts for about 24% of total nonionics. Industrial applications (for which 70% of the material is used) include such applications as textiles, agricultural emulsifiers and metal cleaning. Other applications include use in household liquid detergents. The light-duties, which use sulfated alkylphenol-ethylene oxide adducts, are growing steadily—but not so fast as heavy-duty liquids, where alkylphenol adducts may obtain greatest growth.

Tall Oil-Ethylene Oxide Adducts: The 50-million-lbs. tall oil-ethylene oxide adduct group (80% of which go into low-foaming, heavy-duty household detergents, 20% into industrial use) seems least likely to grow in the future despite their current low price. It's estimated that their share of nonionic markets will drop.

Fatty Alcohol-Ethylene Oxide Adducts: Ethylene oxide adducts of oxo-alcohols (such as tridecyl and decyl) and natural alcohols (such as oleyl, lauryl, cetyl and tallow) account for the major portion of this class. Tridecyl alcohol currently enjoys the bulk of the surface-active agent market, finds its major outlet in household detergents and in industrial applications primarily in the textile industry. Though both the natural and oxoaliphatic alcohols make surface-active agents superior in some respects to the alkylphenol adducts and can be sulfated more economically with sulfur trioxide instead of sulfamic acid, they're more expensive.

The Others: Of the remaining nonionics, several seem vulnerable to foreseeable contingencies. Glycerine and glycol esters and ethoxylated sorbitol esters, for instance, may be restricted in food applications (as softening and antispatter agents), have to search for new markets.

Pluronic-type products should continue to show continued growth; petroleum demulsifiers based on ethylene oxide and/or propylene oxide should show moderate growth, as should ethoxylated mercaptans, now used primarily in textile and metal cleaning applications.

What's Ahead: Based on the assumption that industrial applications of nonionics will grow while non-industrial applications will stay about the same overall (with the emphasis on liquids), the nonionics should enjoy steady growth to 520 million lbs. in the next five years. This should break down something like this: fatty acid-alkanolamine condensates, 155 million lbs. (up from '59's 100 million); alkylphenol-ethylene oxide adducts, 155 million lbs. (up from 90 million); tall oil-ethylene oxide adducts, 20 million lbs. (down from 50 million); fatty alcohol-ethylene oxide adducts, 70 million lbs. (up from 45 million); and miscellaneous, 120 million lbs. (up from 90 million).

Kartridg Pak Expands

The roster of equipment makers supplying the aerosol industry was markedly depleted last week: Alpha Enginering Works, Inc. (Mt. Prospect, Ill.), pioneering producer of aerosol-filling machinery, was purchased by Kartridg Pak Co. (Franklin Park, Ill.). Financial details were not revealed.

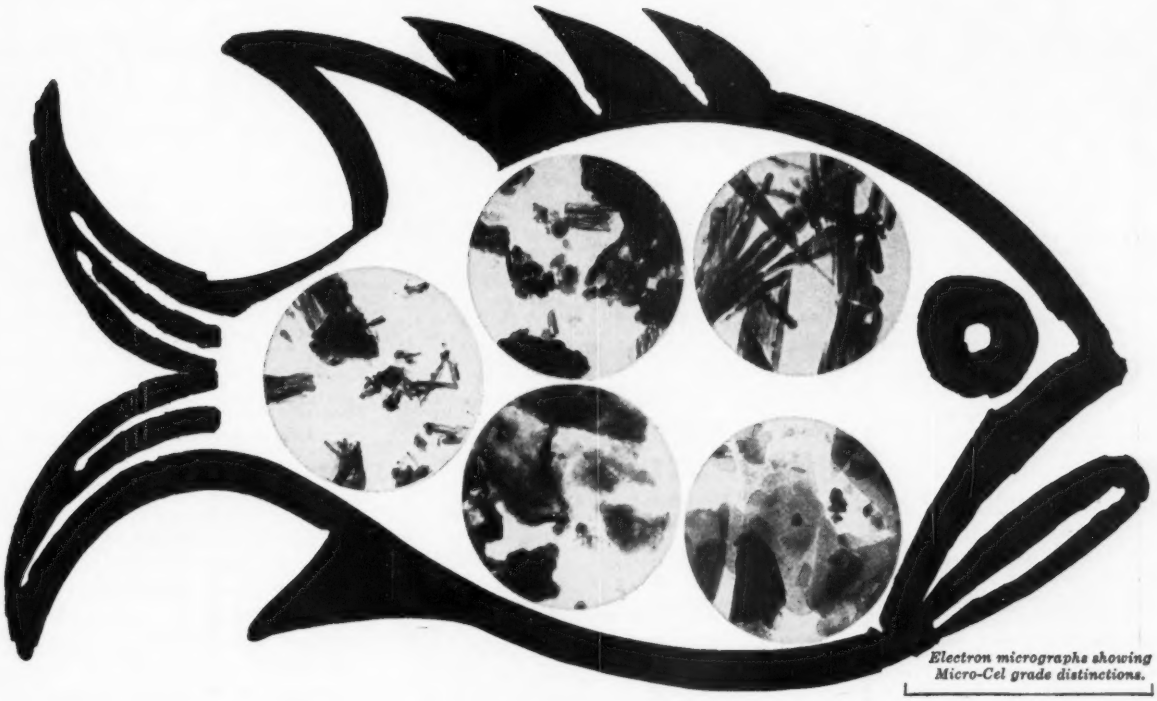
The merger marks Kartridg Pak's second penetration of the aerosol field in the last two years. In '58, the company (a subsidiary of Oscar Mayer & Co., maker of meat processing and packing equipment) acquired Mojonnier Associates, then the largest producer of filling machines.

Harold M. Mayer, president of Kartridg Pak, says the Alpha acquisition will enable his company to strengthen engineering and research facilities, offer a more complete line of products for aerosol packaging.

The acquired company will be operated as Alpha Engineering Service, a division of Kartridg Pak. Manufacturing will be carried on at the Franklin Park plant, while sales and administrative operations will center in Mt. Prospect. Bernard Pass has been named general manager of the new division.

PRODUCTS

Spray-Cleaner: Montgomery Chemical (Jenkintown, Pa.) is adding a new aerosol-packed product to its line of Swish automotive chemicals. It's called Electrokleen, is intended for "drying out" short-circuited ignition systems. To speed up the drying process, a special nozzle releases the product as a drenching spray rather than as a fine mist. The product is said to be effec-



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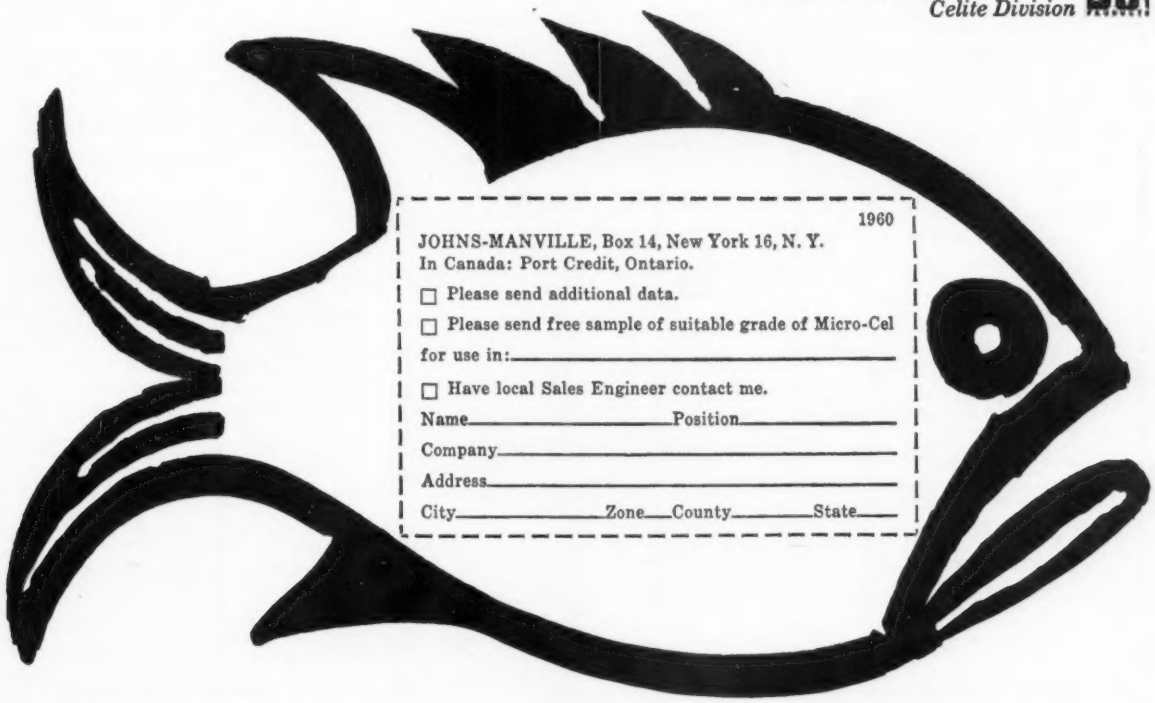

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WANTED 119

ADVERTISING STAFF

Atlanta 3.....Michael Miller, 1301 Rhodes-Haverty Bldg., JAckson 3-6951

Boston 16...Paul F. McPherson, 350 Park Square Building, HUbbard 2-7160

Chicago 11.....Alfred D. Becker, Jr., R. J. Claussen, 520 N. Michigan Ave., MOhawk 4-5800

Cleveland 13....H. J. Sweger, Duncan C. Stephens, 1164 Illuminating Bldg., 55 Public Square, SUperior 1-7000

Dallas 1....Gene Holland, Gordon Jones, The Vaughn Bldg., 1712 Commerce St., Riverside 7-5117

Denver 2.....J. Patten, 1740 Broadway, ALpine 5-2981

Detroit 26.....H. J. Sweger, Jr., 856 Penobscot Bldg., WOodward 2-1793

Frankfurt/Main.....Stanley Kimes, 85 Westendstrasse, Germany

Geneva.....Michael R. Zeynel 2 Place du Port, Geneva, Switz.

London E.C. 4...E. E. Schirmer, McGraw-Hill House, 95 Farringdon St., England

Los Angeles 17.....Robert Yocom, 1125 West Sixth St., HUntley 2-5450

New York 36.....Charles Haines B. A. Johnson, P. E. McPherson, Charles P. Onasch, L. Charles Todaro, 500 5th Ave., OXford 5-5959

Philadelphia 3...William B. Hannum, Jr., 6 Penn Center Plaza, LOcust 8-4330

Pittsburgh 22.....Duncan C. Stephens, Room 1111 Henry W. Oliver Bldg.,

San Francisco 4.....William C. Woolston, 68 Post St., DOuglas 2-4600

St. Louis 8.....R. J. Claussen, 3615 Olive St., Continental Bldg., JEfferson 5-4867

*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60

SPECIALTIES

tive on all electrical parts, starters and generators.

•

Spray Mulch: Alco Oil & Chemical Corp. (Trenton Ave. & William St., Philadelphia) has introduced an elastomeric spray mulch tradenamed Vulcanol for use along highways and on landscapes. It is said to provide low-cost control of soil erosion and to speed seed germination. The spray may be applied with standard equipment.

•

Plant Food Package: The American Agricultural Chemical Co. (New York) is now packaging its Agrico plant food in one-dose packets of laminated aluminum foil and polyethylene developed by Continental Can Co. (New York). The packets —for house plant food and African violet food—have a tear-strip for easy opening.

•

Pigment System: Metro-Atlantic, Inc. (Centredale 11, R.I.), has developed a new system of water-phase pigment printing colors. They are called Metrotex Superfast Colors. Metro claims the colors have greater wash- and drycleaning fastness, increased wet and dry crocking fastness, and better coverage of blotch patterns than previously offered materials.

•

Pushbutton Starch: T. M. Products Co. (Chicago) is marketing a new aerosol starch called Perk Up. The starch is made from a nonyellowing, resin-base plastic, is said to last through several washings. The 15-oz. can retails for 79¢.

•

New Deodorant Maker: Max Factor & Co. (Hollywood 28, Calif.) will enter the feminine deodorant field this month with its Roll-On and Creme deodorants. The products are claimed to be nonirritating, quick drying, and harmless to clothing. The roll-on product is packaged in a blue polyethylene container; the cream in a white plastic jar. Both contain 2 oz. and retail for $1, plus tax.

•

Retail Corn Oil: The A. E. Staley Manufacturing Co. (Decatur 60, Ill.) is offering its pure corn oil for national distribution in grocery outlets. The product had previously been sold only on a commercial basis to large users.

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

Published: each Saturday—closes 11 days in advance.

Rate—$3.00 per line ($1.50 per line for position wanted ads), minimum 3 lines. Allow 5 average words as line; Count one half line for box number.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITIONS VACANT

Chemist—experienced in formulation and quality control of Insecticides, Fungicides and Herbicides. Well established manufacturer located and operating in the Middle Atlantic area has need for two chemists in its current expansion program. Send letter stating training, experience and salary expected to P-4143, Chemical Week.

Production—Research. Challenging opportunity for a chemical engineer to head newly created production and research division in well established and expanding company with young, aggressive management. We are seeking a man with ability and ambition to advance and join top executives. Must have experience in Aerosols, Detergents, and Chemical Specialties, with heavy administrative background in Production, Cost, Packaging, and New Product evaluation. The company is located in New York City. Minimum travel is required. All replies will be kept strictly confidential. Please send complete detailed resume including salary requirements, in first letter, to P-3980, Chemical Week.

Excellent opportunity for man thoroughly experienced in the formulation and production of Styrene Butadiene Latices for use in paints. Location—Metropolitan New York, Salary open. Our personnel know of this ad. P-4225, Chemical Week.

Production Supervisor—Man capable of operating resin processing or distillation equipment for progressive resin house located in Chicago area. Must have supervisory experience. Please write and give full details prior to interview. P-4232, Chemical Week.

SELLING OPPORTUNITIES AVAILABLE

Specialty equipment company requires manufacturers representative. Should be in the 35 to 45 age range and presently handling similar accounts. Several territories open. Submit resume to RW-4099, Chemical Week.

Who Uses It? We are looking for someone with experience in sales or purchasing who knows what fine chemicals are being purchased on a volume basis, what firms are buying them, and can sell to those interested in finding a better or more economical source. SW-4211, Chemical Week.

POSITION WANTED

Desire immediate contact with company demanding profit and requiring skill and experience. Age 37, Relocation possible. 10 years sales including: Plasticizers, Perlitic filter aids, Benzyl Chemicals, Acids, Cutting Oil & Asphalt additives, Fatty Acids & Derivatives, Industrial Oils & Solvents, Wetting Agents & Emulsifiers. PW-4183, Chemical Week.

SELLING OPPORTUNITY WANTED

Successful Sales Organization Available For Exporters to Benelux. Here's rare opportunity for someone seeking a distribution set-up in the Benelux area! For 12 years, with great success, our firm has represented one of the largest U.S. producers of plastic materials. Only because they are setting up their own organization, we will lose one of our major products. We are seeking new plastic and chemical lines. Excellent references. Offices in Brussels and Rotterdam. Write: Imexin S.A., 5, av. de Broqueville, 15 Brussels, Belgium.

PROFESSIONAL SERVICES

Wisser And Cox—Engineers-Geologists. Mineral raw materials from exploration to marketing. 55 New Montgomery-San Francisco, California. YUkon 2-1436. Cables: GEOLOG.

Business Companion. Engineer-Executive retired from large firm available to go with principals or Eng. to survey or set up business in common market area. Knows Europe and languages. Highest references. PS-4250, Chemical Week.

CONTRACT WORK WANTED

Custom Grinding-Ultra Fine or Course-Specialty or Volume Blending and Grinding service on unit or contract basis. Complete CO^2 installation for Nylon, Teflon and Heat Sensitive Materials. A Cramer Corp., 10881 S. Central Avenue, Box 682 Oak Lawn, Illinois.

Custom Blending—Powders or Liquids. Your formulas or ours. Large or small runs. Quality Controls. CWW-4007, Chemical Week.

CHEMICALS FOR SALE

Save Money. Prime Isobutanol Available in tank cars or tank trucks. "World's Smallest Producer." Mercury Chemical Corp., Edison, N.J. Liberty 8-1540.

FOR SALE

Send for Revised Illustrated Circular on our $3,000,000 chemical plant liquidation at Orange, Texas. All T316 SS equipment including tanks, columns, heat exchangers, filters, centrifugals, pumps, valves, pipe, etc. Perry Equipment Corp., 1415 N. Sixth Street, Philadelphia 22, Pa.

Dark Dioctyl Sebacate, Bulk, 32¢ lb. DBS Plast. Virgin Bulk 35¢. Barium Hydrox. N. F. (J. T. Baker Orig.) 15 Leverpaks $0.06/lb. Toluol 10,000 gals. $.20/gal. Isoprene-Enjay virgin 3 drums $.15. Ohio Apex KP23 Plasticizer. Orig. drums $.12/lb. Virgin Neopentyl Glycol-20-100# drums. Trimethylol Propane 20-100# drums. Barrett Pyridine 15A 3 orig. drums $.35/lb. Acetone 10,000 gals. $.45/gal. DDA Plast., Virgin, 20 drs 37¢/lb. FS-4167, Chem. Wk.

Lastiglas Lined Tanks: For immediate delivery —32 Lastiglas lined tanks—from 6,850 Gal. to 31,000 Gal. Priced to sell. Write Frank J. Boitz, Field Manager c/o Brewers & Bottlers Equip. Corp., 104 Asylum Street, Hartford, Conn.

For Sale: 240 Sq. ft. Stainless Steel filter with 17 Stainless riveted screens—"Niagara" Automatic sluicing device—also Stainless slurry feeder—Like new FS-4185 Chemical Week.

American 36" x 84" Vacuum double drum dryer, ASME vacuum chamber, excellent condition. Perry, 1415 N. 6th St., Philadelphia 22, Pa.

ABBE eng. #1B pebble mills, 6' x 8', buhrstone lined, 30 HP motor & drive. Perry Equipment Co., 1415 N. Sixth St., Philadelphia 22, Pa.

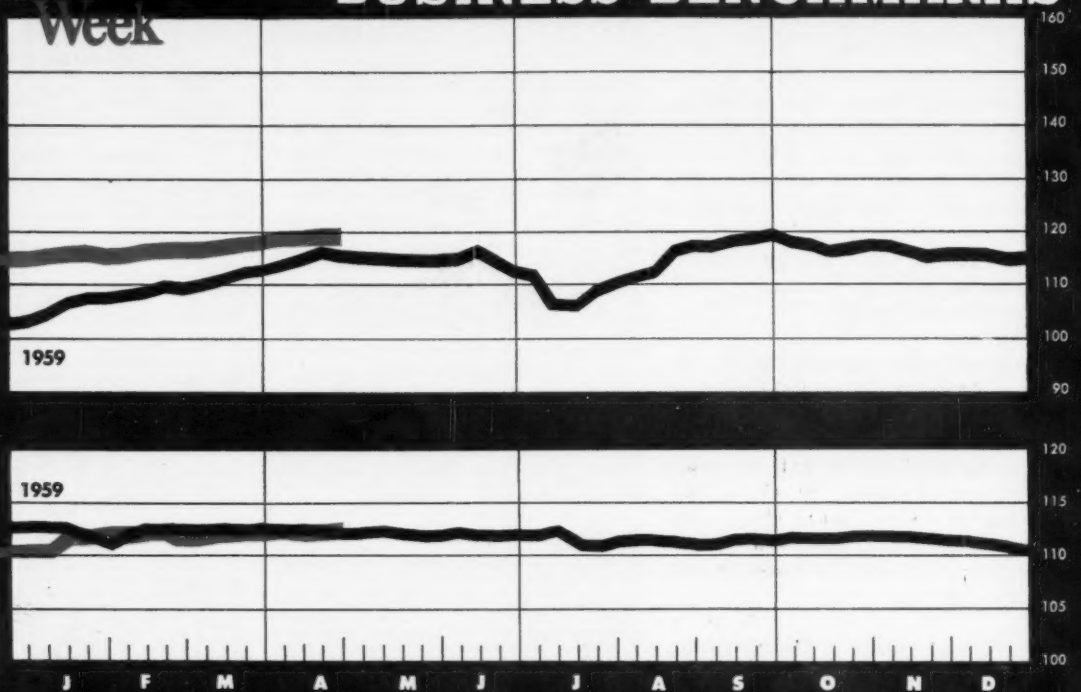
WANTED

Spectrophotometer, used, complete spectrum, recording type. A. Gersen, P. O. Box 658, Passaic, N. J.

OPPORTUNITIES

business; personal or personnel; financial; equipment; etc., may be offered or located through the classified advertising section of CHEMICAL WEEK. For more information, write to: CLASSIFIED ADVERTISING DIVISION P.O. Box 12 New York 36, New York.

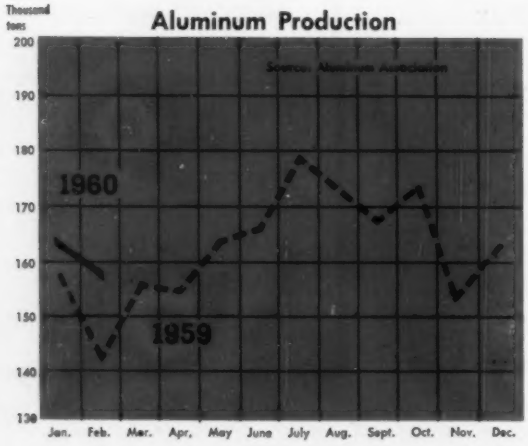
BUSINESS BENCHMARKS

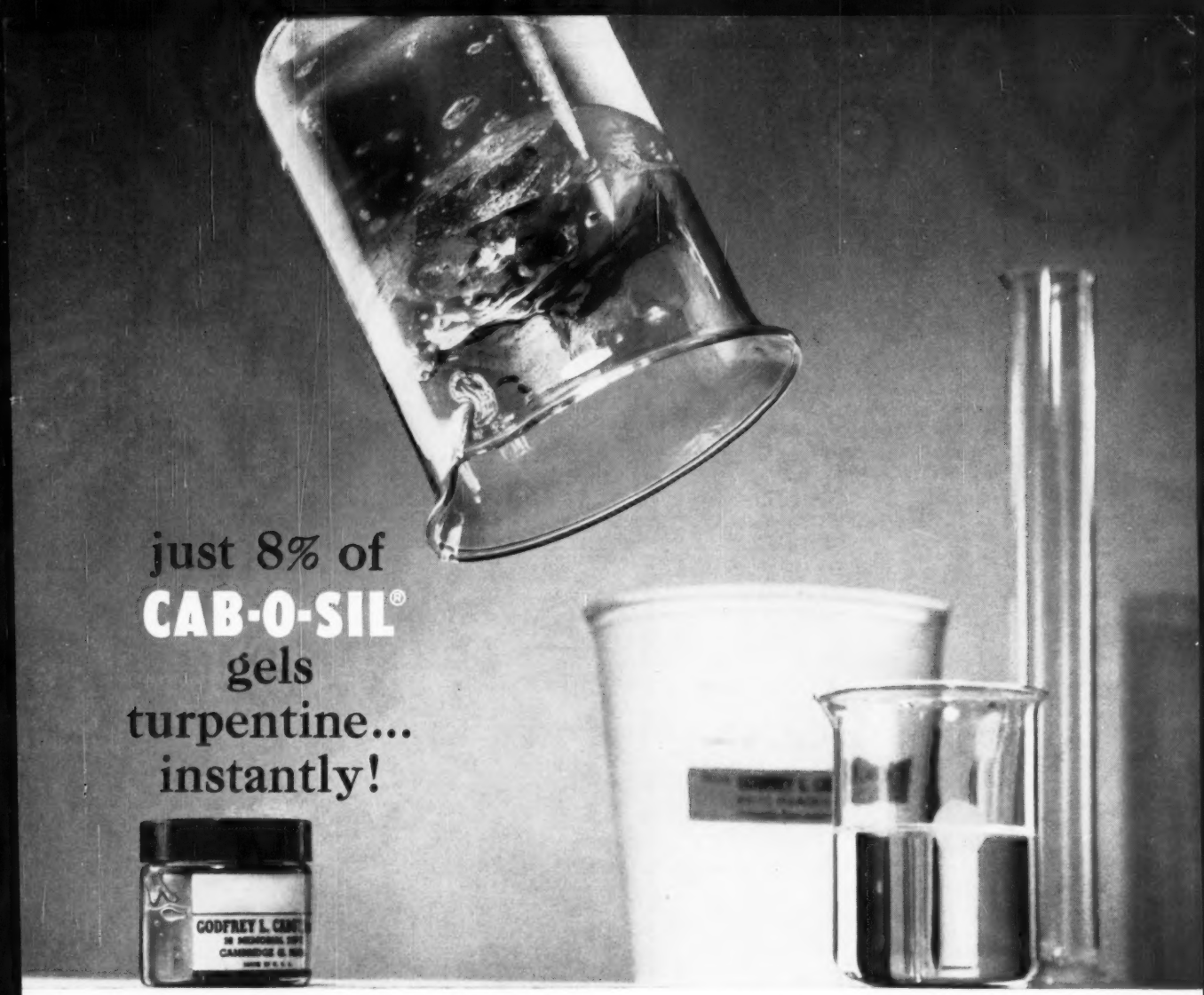


APRIL 23, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1957=100)	119.4	118.9	117.1
Chemical Week wholesale price index (1947=100)	110.8	110.7	112.2
Stock price index (12 firms, Standard & Poor's)	52.66	53.31	54.09
Steel ingot output (thousand tons)	2,277	2,417	2,657
Electric power (million kilowatt-hours)	13,494	13,542	12,604
Crude oil and condensate (daily av., thousand bbls.)	7,028	7,150	7,129

EMPLOYMENT INDICATORS (thousands)	*Latest Month*	*Preceding Month*	*Year Ago*
All manufacturing	16,504	16,438	16,436
Nondurable goods	6,867	6,891	6,894
Chemicals and allied products	857	859	859
Paper and allied products	558	561	562
Rubber products	266	266	266
Petroleum and coal products	232	233	234





airborne silica . . . it's white magic!

Add 8% Cab-o-sil to turpentine — shake a second — turpentine "sets up" instantly. The following percentages of Cab-o-sil by weight produce soft gels with the corresponding liquids: 12% in water; 11% in ethylene glycol; 9% in butyl alcohol; 7% in benzene.

The instant gelling characteristics of super-fine Cab-o-sil®, the "airborne" silica, are useful in improving a wide range of products including lubricating oils, greases, polyester resins, epoxy resins, plastisols, and organosols.

But this kind of "white magic" is just one of the many "miracles" this "different" silica is capable of performing — and in amazingly small concentrations. That's because Cab-o-sil combines exceptional purity and enormous surface area with an unprecedented ease of dispersion, freedom from moisture, and unusual optical characteristics . . . properties which make it one of the most versatile raw materials you can use.

Now produced for the first time in the U.S. — manufactured to meet your exact quality-quantity specifications at Cabot's new Tuscola, Illinois plant — the only U.S. plant manufacturing "airborne" silica.

CABOT

Minerals & Chemicals Div., CW **GODFREY L. CABOT, INC.,** 125 High Street, Boston 10, Mass.

USES:

- **Thixotropic, thickening, gelling agent** — lubricating oils, greases, polyester resins, epoxy resins, plastisols, plastigels, organosols
- **Suspending agent** — paints
- **Flatting agent** — varnishes, lacquers, organosols, plastisols
- **Reinforcing agent** — rubber, silicone, latex film
- **Anticaking agent** — sulfur, insecticides
- **Antislip agent**—solvent-base floor waxes
- **Precoating material** — reproduction paper
- **Low temperature thermal insulation**
- **Pharmaceuticals and cosmetics — (See bulletin #cpha-1)**

Please send ☐ free Cab-o-sil sample and other technical data checked

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

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Technical data available:

( ) General Properties, Functions and Uses (#cgen-1)
( ) Cab-o-sil in the Rubber Industry (#crub-1)
( ) Cab-o-sil in Butyl Rubber (#crub-2)
( ) Cab-o-sil in Dipped Latex Films (#crub-3)
( ) Cab-o-sil in the Lubricating Grease Industry (#cgre-2)
( ) Aqueous Dispersions of Cab-o-sil (#cmis-2)
( ) A Flatting Agent for Varnishes (#cpai-3)
( ) Cab-o-sil in the Reproduction Paper Industry (#cpap-1)
( ) Cab-o-sil in Polyester-Glass Reinforced Plastics (#cpla-1)
( ) Cab-o-sil in the Plastics Industry (#cpla-2)
( ) Cab-o-sil in Automobile Polishes (#cpol-1)
( ) Cab-o-sil in Pharmaceuticals and Cosmetics (#cpha-1)

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No slip showing

Modern latex backing keeps rugs attractively and economically planted. And TITANOX® white titanium dioxide pigments in the latex, put more appeal in the showroom.

Out front or quietly in the background, TITANOX white pigments give latex products that *extra* appeal that makes the difference. For the clean, bright backing of today's rugs and carpets is a far cry from the drab, dark backing of the past. It helps keep sales figures firmly planted on an upward path.

There are one or more types of TITANOX white pigment—rutile and anatase titanium dioxides, and also titanium-calcium—not only for latex coatings, but for everything that needs white pigment . . . paint, paper, rubber, plastics, inks, porcelain enamels, textiles and leather to name some. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments Ltd., Montreal.

TITANIUM PIGMENT CORPORATION

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